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CYBERPEACE THROUGH CYBERSPACE: NATION-BUILDING AGAINST TRANSNATIONAL TERRORISM

by

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Due to recent vulnerabilities of Department of Defense (DoD) networks, along with the rising importance of cyberspace and cyberspace warfare endeavors among competing great powers, the DoD is quickly recognizing the importance of cyberspace. At the same time, the roles of the military are shifting from traditional, strategic and conventional conflict into what Secretary of Defense Robert Gates calls "soft power"—the capacity to perform nation-building missions against transnational terrorism.

Cyberspace operations can play an important role in soft power as developing countries grow in their connectivity to information, especially with the proliferation of cell phone networks. By the end of 2010, 71 percent of new Internet users will be from developing nations. Ninety percent of the entire globe already has mobile phone access. This thesis studies two promising utilizations of mobile phones: mobile money and mobile surveillance. It is found that mobile money may reduce the threat of crime in non-stable areas where the United States is conducting nation-building operations. It then discusses new technologies through mobile phones and mobile devices which may help to prevent the theft of WMD.

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CYBERPEACE THROUGH CYBERSPACE:
NATION-BUILDING AGAINST TRANSNATIONAL TERRORISM

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ABSTRACT

Due to recent vulnerabilities of Department of Defense (DoD) networks, along with the rising importance of cyberspace and cyberspace warfare endeavors among competing great powers, the DoD is quickly recognizing the importance of cyberspace. At the same time, the roles of the military are shifting from traditional, strategic and conventional conflict into what Secretary of Defense Robert Gates calls "soft power"—the capacity to perform nation-building missions against transnational terrorism.

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LIST OF ACRONYMS AND ABBREVIATIONS

AFRICOM	U.S. Africa Command
ATM	Automated Teller Machine
CENTCOM	United States Central Command
CGAP	Consultative Group to Assist the Poor
CIA	Central Intelligence Agency
COIN	Counter Insurgency
CPA	Coalition Provisional Authority
CPI	Corruption Perception Index
DFI	Development Fund for Iraq
DFID	U.K. Department for International Development
DHS	Department of Homeland Security
DoD	Department of Defense
DoS	Department of State
EFT	Electronic Fund Transfer
FM	Field Manual
GDP	Gross Domestic Product
GPS	Global Positioning System
HDI	Human Development Index
HDR	Human Development Report
HEU	highly enriched uranium
IAEA	International Atomic Energy Association
IRFF	International Reconstruction Fund Facility
ISR	Intelligence, Surveillance and Reconaisance
ITU	International Telecommunications Union
IWA	Integrity Watch Afghanistan
KRL	Khan Research Labratories
LEU	low enriched uranium
MIT	Massechusets Institute of Technology
NECSA	Nuclear Energy Corporation of South Africa
NGOs	Non-governmental organizations
ORHA	Office of Reconstruction and Humanitarian Agency
PIN	Personal Identification Number
PMO	Program Management Office
SOEs	state-owned enterprises

TI	Transparency International
UAVs	unmanned aerial vehicles
UK	United Kingdom
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States
USACE	United States Army Corps of Engineers
USAID	United States Agency for International Development
USG	United States Government
USSR	Union of Soviet Socialist Republics
WMD	weapons of mass destruction

EXECUTIVE SUMMARY

Due to recent vulnerabilities of Department of Defense (DoD) networks, along with the rising importance of cyberspace and cyberspace warfare endeavors among competing great powers, the DoD is quickly recognizing the importance of cyberspace. At the same time, the roles of the military are shifting from traditional, strategic and conventional conflict into what Secretary of Defense Robert Gates calls "soft power"-- the capacity to perform nation-building missions as a hedge against transnational terrorism.

Cyberspace operations can play an important role in soft power as developing countries grow in their connectivity to information, especially with the proliferation of cell phone networks. By the end of 2010, 71 percent of new Internet users will be from developing nations. Ninety percent of the entire globe already has mobile phone access. This thesis therefore studies two promising utilizations of mobile phones: mobile money and mobile surveillance.

The effective use of mobile money through cyberspace may prove effective in nation-building missions by providing incentives against robbery specifically and crime in general. Furthermore, mobile money and mobile surveillance may also have a positive impact against corruption rates, which would bring greater security in the context of transnational terrorists and their efforts to acquire WMD. These technologies, as well as many other capabilities in cyberspace, may be very effective as hybrid capability that is so useful in soft power, and through which the DoD is now pursuing nation-building missions as well as counterterrorism. This will become more important as devices continue to become more portable and accessible to the developing world.

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I.   INTRODUCTION

The U.S. government and the Department of Defense (DoD) are quickly realizing the importance of cyberspace. Due to recent vulnerabilities of DoD networks, along with the rising importance of cyberspace and cyberspace warfare endeavors among competing great powers, the DoD recognized cyberspace as another domain akin to Air, Land, Sea and Space.[1] Secretary of Defense Robert Gates issued an order on June 23, 2009, which gave birth to the new U.S. Cyber Command, charged with defending the military's portion of cyberspace.[2] Similarly, in May of 2010, the Air Force recoded most of its communications officers and enlisted airmen, making them Cyberspace Operations personnel and requiring more training and expertise in advanced network defense. The Army, Navy and Marine Corps are undergoing similar restructuring. The DoD is positioning itself to be effective in the use of military force to achieve cyberspace superiority as with the other domains.

However, the roles of the military across all domains have also been changing since the end of the Cold War. Today, after the defeat of Iraq's Ba'athists and weakening of Afghanistan's Taliban, the U.S. military has been placed in charge of stabilization operations and building well-functioning states. These missions include forming new militaries and police, management to build infrastructure, and the facilitation of services such as hospitals, power plants, and schools. Increasingly, the U.S. military finds itself departing from the traditional role of state-on-state warfare and thrust into the role of nation-builder and promoter of good governance.[3]

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[1] William Jackson, "DOD Establishes Cyber Command to Assume Defense of Military Cyberspace," *Government Computer News*, June 24, 2009, at: http://gcn.com/Articles/2009/06/24/DOD-launches-cyber-command.aspx (accessed October 21, 2010).

[2] Ibid.

[3] Note- "State building" is a more accurate term, since a nation of people does not necessarily conform to a country's border. However, in colloquial speaking the term "nation-building" is prevalent. Therefore, this paper will use the more familiar term of nation-building.

While the military does this, it must also continue to provide security against insurgencies, often fueled by transnational terrorism, and under the constant threat of WMD. For this reason, Secretary Gates has also begun to reposition DoD assets. Thomas Barnett notes:

> Given what war is now, in the age of transnational terrorism, Gates is firmly committed to beefing up the Defense Department's 'soft power' capabilities, meaning those pertaining to stability operations and nation-building… Clinging to the new, hot-button concept of 'hybrid war,' Gates defends this historic institutional shift by noting that his new budget breaks down roughly as '10 percent for irregular warfare, about 50 percent for traditional, strategic, and conventional conflict, and about 40 percent dual-purpose capabilities.'[4]

This thesis addresses the question of how cyberspace can be used for nation-building, especially with respect to the overarching objective of combating transnational terrorism.

It was transnational terrorism, and more specifically the threat that transnational terrorists would procure WMD, that provided a key rationale for invading Afghanistan and Iraq; not regime change, but thwarting their capacity to acquire and use WMD after the attacks of 9/11. Although never found in Iraq, it was widely believed by numerous government intelligence agencies that Iraq possessed WMD, or was at least actively trying to get them, and that WMD could fall into the hands of transnational terrorists who threaten the U.S. homeland and interests abroad. Nation-building only came as a consequence to that invasion. This was also a consideration for Afghanistan, which had harbored Osama Bin Laden and his associates who killed over 3,000 people on September 11, 2001. Although Afghan insurgents have never been known to possess WMD, many fear their acquisition at the hands of Afghans after the 9/11 attacks.[5] Afghanistan has a poorly controlled border with Pakistan, which possesses nuclear weapons and weapons-grade nuclear fuel. Therefore, the threat of WMD and their

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4 Thomas Barnett, "Sleeper: The Awakening of Robert Gates," *Esquire*, February 2010, at: http://thomaspmbarnett.squarespace.com/globlogization/2010/8/27/blast-from-my-past-sleeper-the-awakening-of-robert-gates-201.html (accessed October 27, 2010).

5 Robert Wesley, "Al-Qaeda's WMD Strategy Prior to the U.S. Intervention in Afghanistan," *The Jamestown Foundation*, October 7, 2005, at: http://www.jamestown.org/programs/gta/single/?tx_ttnews%5Btt_news%5D=580&tx_ttnews%5BbackPid%5D=180&no_cache=1 (accessed November 29, 2010).

proliferation within transnational terrorist networks is likely the highest priority of military operations, setting the context for nation-building today. The risk of future stability and nation-building operations exists in other areas of the world as well given today's extensive internationally organized-crime networks and the wider availability of WMD technologies and components as a result of an increase in nuclear-armed states and more reliance on nuclear power.

Given the nature of the proliferation threat and the U.S. military's changing role, it is critical the DoD consider the use of cyberspace to aid soft power missions in nation-building. Many believe this is not possible due to the technological aspects of cyberspace and the traditional requirement of a developed world's infrastructure. How can one build state capacity in cyberspace in failed or post-conflict states that usually have little in the way of computers and electricity, let alone fiber optic cables and data warehouses?

Fortunately, this is an antiquated, 1990s vision of cyberspace. As we enter into the second decade of the twenty-first century, cyberspace is now more personal and portable than just a few years ago. The International Telecommunications Union (ITU), a telecommunications division of the U.N., issued a report on October 19, 2010, stating that the developed world has been slowing down in Internet growth while the developing world's use is rapidly growing at an accelerated rate. Their report predicts that by the end of 2010, there will be 226 million new Internet users, 71 percent of whom will be from developing nations.[6] Furthermore, the report states that 90 percent of the entire globe now has mobile phone access, again with most growth seen in the developing world.[7] The report notes that "ITU's new data indicate that among the estimated 5.3 billion mobile subscriptions by the end of 2010, 3.8 billion will be in the developing world."[8] The line between mobile phone and Internet access is also shrinking as mobile phones with broadband are expanding rapidly as well within developing countries. The number of countries with mobile phone broadband access has increased from 95 in 2007

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6. Text from the International Telecommunication Union website, "ITU Estimates Two Billion People Online by End 2010," October 19, 2010, at: http://www.itu.int/net/pressoffice/press_releases/2010/39.aspx (accessed October 21, 2010).

7. Ibid.

8. Ibid.

to 143 in 2010.[9] Even faster, newer generation broadband is also on the horizon. cyberspace should therefore be recognized not as a domain exclusive to great powers and developed countries, but as a new and rapidly growing domain within the developing world, and therefore an effective means through which the DoD can help build state capacity in efforts that align with the goals of Secretary Gates.

Cyberspace, when leveraged by governments to build institutions, may also be called e-governance. The U.S. government defines e-governance as the use of "web-based Internet applications or other information technology to enhance the access to and delivery of government information and services to the public, other agencies, and other government entities; or to bring about improvements in government operations that may include effectiveness, efficiency, service quality, or transformation."[10] The DoD can use these techniques within states where stability operations and nation-building operations exist, as well as export them to states vulnerable to transnational terrorism and the threat of WMD proliferation.

Covering the breadth of cyberspace's application to all soft power capacity within the context of DoD operations is too vast for a single thesis. Therefore, this thesis will focus on the application of cyberspace, by either the DoD or other aspects of USG, for nation-building missions specific to providing security by combating crime and corruption, both of which create an environment where terrorists can flourish. For crime, it will examine one cyberspace technology to combat crime: mobile money. Then, this thesis will transition to the context of transnational terrorism and the biggest threat in its efforts to acquire WMD: corruption. Finally, it will address another cyberspace technology to combat corruption: mobile surveillance. These uses of cyberspace can produce the hybrid capability that Secretary Gates is looking for: a soft power capable of both nation-building as well as reducing the threat of transnational terrorism.

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9. Telecommunication Union, "ITU Estimates Two Billion People Online by End 2010."

10. Text of "The E-Government Act of 2002," annotated by Jeffrey Schildkraut, on the U.S. Department of Labor, Bureau of Labor and Statistics Web site at: http://www.bls.gov/opub/cwc/cm20030220yb02p1.htm (accessed April 19, 2010).

A.   IMPORTANCE

There is a significant gap in research on e-governance and its potential to enhance national security. This dearth is primarily due to the very recent and rapid development and spread of cyberspace technology. Its potential in the security arena is just now being considered. Research into the application of these technologies, many of which are relatively inexpensive, is critical in realizing new synergies for homeland security. Specifically, this research is important to U.S. security in a scenario where post-conflict states must be rebuilt quickly before any insurgency is to take hold, as well as against transnational terrorist organizations like al Qaeda that may use these weak or failing states to acquire WMD. E-governance can help nation-building, and in turn reduce the threat of transnational terrorism.

There exist global best practices that can enhance security, transparency and accountability, yet crime and corruption are still rampant in many countries, indicating that there is either too little will, knowledge, or resources to counter them effectively. E-governance can very likely help implement best practices and help fill the void. One cyberspace application of e-governance can be through mobile money, which is the use of e-money through mobile phones. Mobile money shows promise in delivering much greater security for citizens to store and transfer their money, both to the government and each other in exchange for goods and services-- critical in weaker, less stable states with rampant crime. E-money—which is any digital money to include credit cards, bank transactions, online banking, and the like—can circumvent theft because it eliminates the need for physical currency, the preferred method of transactions by criminals, transnational terrorists, and organized crime members.   Middlemen may be circumvented, and payments can be issued directly from a legitimate state institution, such as a reputable bank, to the individual, such as nuclear laboratory scientists, weapons guards, or customs and port officials. E-money may be particularly applicable to countries with nuclear arsenals and high corruption indexes such as Russia, Pakistan,

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India, and China.[11] Of equal benefit, e-money can also enhance accountability. E-money, when implemented with audit trails that require government-certified institutions and non-anonymous transactions, is an effective form of e-governance which makes theft and corruption more difficult.

Another best practice is the proliferation of open-source surveillance. With cell phones increasing in both number and capability in the developing world, citizens are now capturing crime and corruption on videos, then uploading them to the Internet, forcing national and international action. One such case took place in Malaysia, where citizens armed with cell phone cameras have begun capturing police engaging in corrupt practices, then posting these pictures and videos on the Internet.[12] These practices enhance both transparency, in that the general public and government officials can see what takes place, as well as accountability, either through voting or domestic and international opinion and pressure. This factor is not limited to citizens or cell phone use, however. Governments can also install surveillance in government institutions and display it through the Internet, even when guarding sensitive items like WMD. Officials would then be less likely to take a bribe or look the other way if they thought they were being recorded anywhere by anyone, including both their governments as well as ordinary citizens.

B.   PROBLEMS AND HYPOTHESIS

Perhaps the most important problem raised by cyberspace governance is in its unrealized potential. Little has been written about it, especially as technology continues to rapidly evolve. For example, the iPhone can now stream real-time video, monitor security cameras, act as a remote control, and provide GPS navigation with satellite

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[11] Text from Transparency International Website, "Survey Indices 2009," at: http://www.transparency.org/policy_research/surveys_indices/cpi/2009/cpi_2009_table (accessed September 28, 2010).

12. Text from Global Voices "Cellphone Video Captures Police Excess," at: http://globalvoicesonline.org/2006/09/07/malaysia-cellphone-video-captures-police-excess/ (accessed June 16, 2010).

maps, all from a single hand-held device that fits inside a pocket.[13] Other technologies like smart cards can transfer money without even the need of a computer network at all. These exciting, small, inexpensive, and widespread technologies possess great potential for e-governance at home and abroad, but their application by the DoD is nascent. These technologies started as commercial, privately used products in the developed world, yet have untapped potential for security applications by states, both rich and poor. Troops, not policymakers, have often been at the forefront of applying these commercial technologies to security challenges they have faced in Afghanistan and Iraq. Application of cyberspace technologies need not be this ad-hoc and limited to innovating units, but instead needs concerted thought, evaluation, and distribution of new ideas in partnerships between the DoD, NGOs and private corporations. Its application may be difficult to achieve if policymakers from an older, less technologically savvy generation cannot envision or embrace its potential.

A related challenge is the dearth of concrete studies and recent data specific to e-money, crime and corruption. For example, Kenya is one country that has in the past few years aggressively pursued the use of e-money in some regions but not others through the innovative use of cell phones. Kenya also possesses detailed statistics on national and provincial crime. This data can be accessed and examined in a natural experiment to see if a pattern exists between the crime statistics within areas with access to e-money contrasted with crime statistics within areas void of access to e-money. To date, such studies have yet to be conducted. While great strides have been made in recent decades to assess crime and corruption levels, considerably more work needs to be done to measure and understand this problem.

Given the evolving framework of technology in wireless handheld devices, combined with their shrinking cost, solutions now require far less money and physical infrastructure than they once did. Technological solutions to security problems have traditionally required significant infrastructure and monetary resources to support them,

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13. Dan Frommer, "25 Things You Can Remote Control with Your IPhone," *Business Insider*, March 16, 2010, at: http://www.businessinsider.com/25-things-you-can-remote-control-with-your-iphone-2010-3 (accessed May 9, 2010).

such as large environmentally controlled rooms of computers, network cables, and stringing of phone lines, and UAVs that try to but cannot be everywhere at once. E-governance is increasing in relevance within the developing world more than many are aware. The fact that software has also continued to evolve at a rapid pace makes e-governance just as applicable to the developed world, especially as it can improve existing banking and security integration among state-controlled WMD sites through rapid and relatively simple adaptation and redeployment. Policymakers will need to make the political decision to shift resources from heavily infrastructure-reliant manufacturers and governments that measure development by how large and visible their project footprint is, to industry newcomers that are considerably more mobile, quickly adaptable, and less flashy. Indeed, adoption of smart cards does not provide ribbon-cutting opportunities as do UAVs or new government buildings.

This thesis will consider the political and technological issues presented here, especially as they apply to good governance and building of state capacity. Despite challenges, it is hypothesized that e-governance through cyberspace could and should be applied by the DoD to promote good governance in weak states. This soft power approach to combating crime and corruption, two key indicators of state weakness, can help reduce the risk of transnational terrorism due to relatively low cost, ease of use, widespread availability, adaptability, and ultimate ability to counter crime and corruption, both of which are sufficient conditions for transnational terrorism in weak states.

C.   LITERATURE REVIEW AND THEORY

1.   Crime and Transnational Terrorism

When discussing nation-building operations, the concept of myopic behavior is important, because it can describe a wide spectrum of citizens in a weak or failing state and how they view the world. To be myopic, a state's citizenry can be described as short sighted in a figurative sense, meaning they take actions which favor the present or immediate gain much more than the future, such as holding fast to principles for a greater gain over time. This concept is significant because it is influenced by security and

influences crime and corruption through what is known as the "wheel of violence." It is therefore applicable to many nation-building operations, and especially post-conflict states where terrorism can thrive.

The "wheel of violence" describes how illegitimate physical harm, or a lack of security, increases uncertainty, which increases myopic behavior.[14] Myopic behavior in turn increases crime and corruption as citizens look for more immediate gain, regardless of principles, in the wake of more uncertainty about the future. This causes societal risk to increase, which also leads to economic decline.[15] This economic decline tends to instigate more crime and violence, thus continuing the cycle.[16] Conflict leads to decreased savings, increased depreciation, and therefore increased risk. New investment is not quickly integrated due to the myopic behavior of the population.
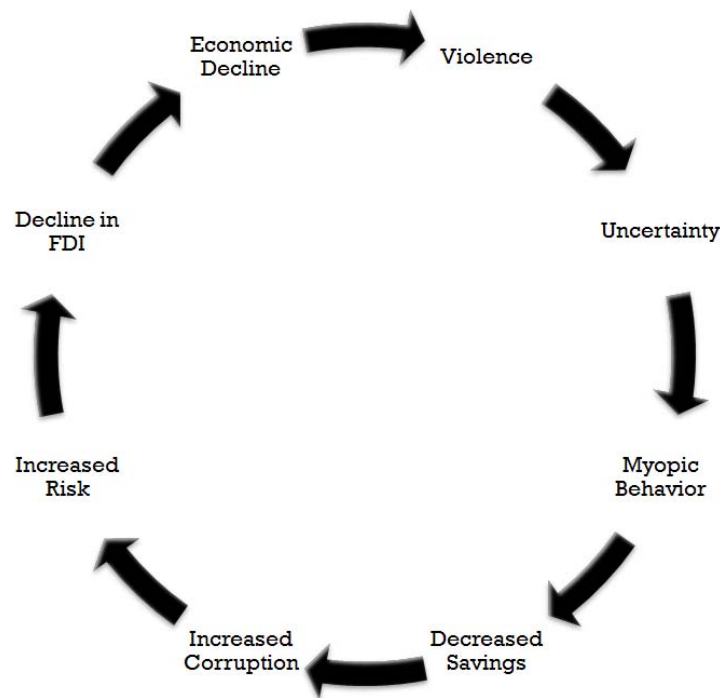
Figure 1.   Illustration of The Wheel of Violence

14. Text from Dr. Robert McNab, "Introduction to Economics of Insurgencies" PowerPoint lecture, Defense Resource Management Institute (accessed November 8, 2010 in e-mail from Dr. McNab).

15. Ibid.

16. Ibid.

This relationship may be hard to understand conceptually; however, there is a good model which describes it. The Solow model accounts for the diminishing return of capital in relationship to violence. The first principle of the Solow model is that the capital-to-labor and capital-to-output ratios are not fixed. This means that, at some point along the capital to output function, the infusion of capital increases at a decreasing rate, thus requiring more capital infusion for less increase in output.
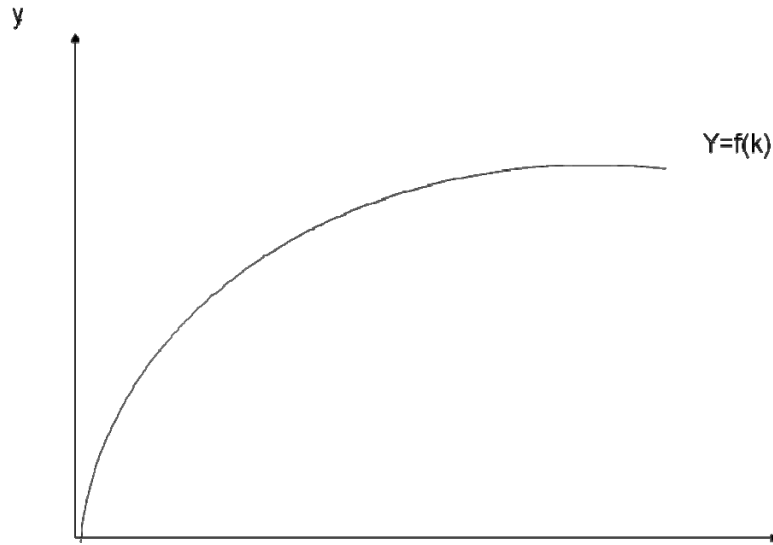
Figure 2.   y = Output per Worker and k = Capital per Worker[17]

When violence increases, the labor force declines as those with the means to do so flee the country. This flight of labor, or human capital vested in experienced workers, is slow to recover. As new investment flows in, it cannot be absorbed as well as it once was due to the increased depreciation of infrastructure and support, as well as the decreased labor and human capital.

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17. McNab, "Introduction to Economics of Insurgencies."
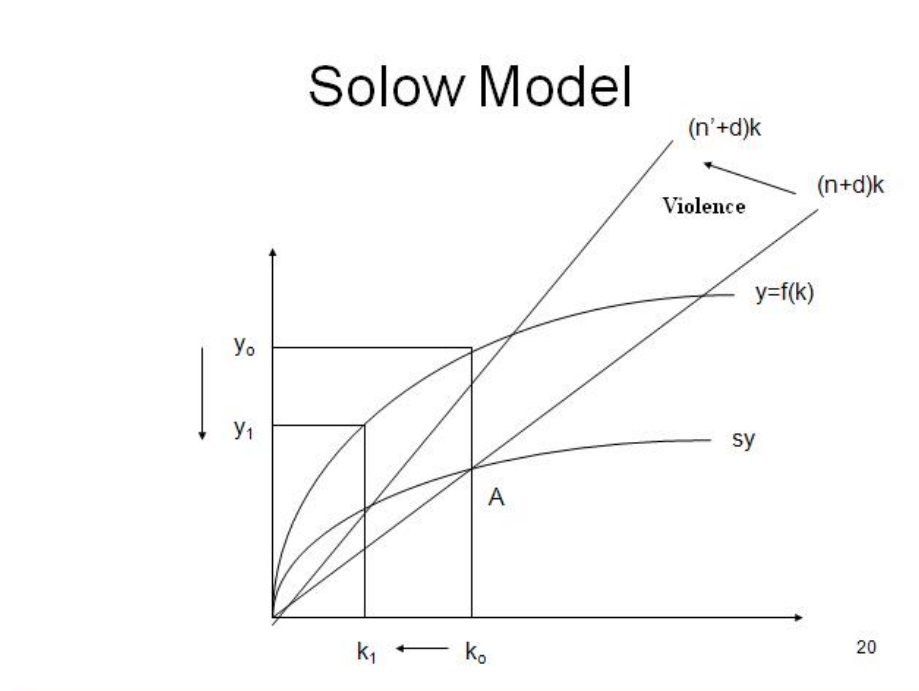
Solow Model

Figure 3.   (n + d)k Is the Change in Capital per Worker Due to Population and Depreciation Influenced by Violence[18]

To understand the Solow model, consider the investment of a hospital in an area plagued with post-conflict violence or extreme crime. Foreign or government aid can build a modern hospital, but who will operate and maintain it?   Local doctors, administrators and entrepreneurs were likely the first to flee the area when conflict arose, or may not be there due to high crime. This has a negative effect on population and depreciation relative to capital per worker. If equipment breaks, many technicians and industrial equipment are in short supply. It takes years, even decades, to rebuild the inherent human capital within these states to maintain these ventures with self-sufficiency. Even worse, if there is a fear of future conflict or lack of security, myopic behavior will persist, thus limiting future investment absorption capacity even further.

Under this illustrative example with the Solow growth model, there may be four doctors in a local area. If you invest enough to build a hospital that can employ ten doctors, you will have to increase investment substantially to pay the transaction cost of

18. McNab, "Introduction to Economics of Insurgencies."

getting six more doctors to relocate to the local area. This cost is much greater than the cost of employing the first four doctors who still live in the area and are looking for work. This difference is important because it is a fundamental, driving principle in nation-building. It is often tempting to think one can simply invest significant capital in a post-conflict or weak state and expect a linear increase in output. With the Solow model, however, one can understand the most efficient investment of capital, especially as it relates to security and myopic behavior of the country. Output is not linear, but constrained to local support. This local support is key in a weak state which may lack the governmental capacity through institutions to facilitate security or investment.

"Hard Lessons," published by the Special Inspector General of Iraq Reconstruction Stuart Bowen, Jr., is a well-respected report which summarizes the findings of hundreds of interviews and investigations regarding the United States' reconstruction efforts in Iraq.[19] It is also perhaps the best analysis of the impact of crime in a weak state without local capacity to support security or investment. The Iraq of 2003 to 2004 was the quintessential weak state, with high crime, high corruption, insecurity, and the lack of infrastructure and services. This condition fostered transnational terrorism within the context of U.S. nation-building operations. Bowen provides a window into the security assumptions regarding reconstruction that coalition planners made going into Iraq, how they applied their instruments of power to achieve those effects, the philosophy they pursued while applying that power, and the results of their efforts with regard to crime, and eventual terrorism in Iraq. Ultimately, Bowen demonstrates that efforts against crime and terrorism were largely ineffective due to the lack of a single point of interagency reconstruction management, thereby preventing cohesive implementation of a strategic security and economic plan. Use of cyberspace is mostly non-existent.

Perhaps the most fundamental assumptions the coalition made regarding economic reconstruction, as well as reconstruction in general, was that it would last as

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[19] Elizabeth Newell, "Commission on Wartime Contracting Hears Advice from Special IG," *GovernmentExecutive.com*, February 2, 2009, at: http://www.govexec.com/dailyfed/0209/020209e1.htm (accessed December 8, 2010).

short as two years, it would virtually pay for itself through oil revenue, and crime would not be a serious issue, because Iraqis would welcome harbingers of democracy. [20, 21, 22] These assumptions now seem very unrealistic, especially in light of the Departments of State and Defense "Parade of Horribles" memo published at the time. This memo, which countered such assumptions, went mostly ignored.[23] Until the launch of the war, and even through its conclusion through May of 2003, the coalition's naïve optimism remained. It did not plan to need any significant security force to guard economic reconstruction efforts, such as oil pipelines or financial institutions. Quite the contrary, CENTCOM planned to reduce troops to 30,000 by August of 2003.[24]

Finally, while each agency had its own plan for post-war Iraq, there was no overarching, coordinated strategic plan that took into account important elements like sequencing of change and the interplay between sectors and initiatives. Overall operational control was given to the new Office of Reconstruction and Humanitarian Agency (ORHA) within the DoD, but constant power struggles and alienation of the State Department rendered ORHA mostly ineffective.[25] The U.S. Treasury Department was put in charge of the overall financial recovery and development of Iraq's economy, USAID planned for economic stability as it related to humanitarian relief and some infrastructure repair, and the DoD planned to operate the massive oil industry which, it was believed, would be the "silver bullet" to spur economic growth for Iraq from providing fuel to power plants and revenue for infrastructure and investment.[26] [27] Throughout the economic planning, little involvement from Iraqi citizens was mentioned.

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20. Stewart Bowen, Jr., *Hard Lessons: The Iraq Reconstruction Experience*, (Washington D.C.: US Independent Agencies and Commissions, 2009), 13.

21. Ibid., 11–12.

22. Ibid.

23. Ibid., 13.

24. Ibid., 72.

25. Ibid., 45–46.

26. Mark Matthews, "Pre-war Predictions of Quick Exit, Oil-financed Reconstruction Evaporate," *Los Angeles Independent Media Center*, June 28, 2003, at: http://la.indymedia.org/news/2003/06/68330_comment.php (accessed December 8, 2010).

27. Bowen, *Hard Lessons: The Iraq Reconstruction Experience*, 20-21.

With these fundamental assumptions and disjointed planning in place, the coalition set forth to shore up its economic plan. First, Treasury's plan for Iraq's economic recovery rested on transforming it from a statist economy to a stable and open market economy using two fundamental pillars: stabilizing Iraq's currency and restoring operations among Iraq's financial institutions, to include the central and commercial banks.[28] [29] The Treasury Department planned to fund these efforts by seizing Iraqi assets to continue payment of government employees as well as securing financial institutions.[30] Meanwhile, USAID continued to link economic stability with humanitarian efforts and, therefore, planned for employment and micro-lending programs to jump-start the Iraqi economy post-conflict.[31] The DoD plan for the oil industry joined the Army Corps of Engineers (USACE) with Halliburton's KBR to stop any oil fires lit by a falling Iraqi army, upgrade dilapidated equipment, and ultimately help run the industry.

For the most part, the Treasury Department's plan was a success story.[32] On March 20, 2003, President George W. Bush authorized the freezing of Iraqi funds totaling $1.9 billion, which the treasury used to pay Iraqi salaries until it set up a more permanent solution.[33] Two months later, UN Resolution 1483 created the Development Fund for Iraq (DFI), which utilized 95 percent of Iraq's oil revenue to fund both reconstruction efforts as well as administration payments. [34] Incidentally, both of these events led to the largest airborne transfer of physical currency in history, with regular airborne shipments between New York and Baghdad starting at $20 million and ending at $4 billion.[35] Afterward, the treasury department moved swiftly and effectively to secure debt relief for

28. Bowen, *Hard Lessons,* 86.

29. Ibid., 30.

30. Ibid., 31.

31. Ibid., 20–21.

32. Text from U.S. State Department, "Iraq Completes Debt-swap, Receives IMF Standby Arrangement," December 29, 2005, at: http://merln.ndu.edu/MERLN/PFIraq/archive/otherpolicy/27-640791.pdf (accessed December 8, 2010).

33. Bowen, *Hard Lessons: The Iraq Reconstruction Experience*, 31.

34. Ibid., 80.

35. Ibid., 88–89.

Iraq from the international community, ultimately resulting in cutting Iraq's international debt of $130 billion by up to 80 percent and preventing the economy from collapsing.[36] Finally, Iraqi bank notes were successfully exchanged for post-Saddam currency. Although there were terrorist attacks, none stopped the conversion, and the currency exchange program was a success that resulted in the new dinar appreciating against the U.S. dollar.[37]

However, the overall application of power was a failure due to rampant crime and insecurity, which helped fuel sectarian violence and an insurgency. At the most critical time of reconstruction, leadership was in transition as well as in a vacuum. ORHA was ousted from the CPA just a month after the invasion, and the CPA was closed just a year later.[38] [39] In perhaps the most critical window of opportunity in post-war Iraq, Paul Bremer made many decisions and prioritized projects as head of the CPA without the input of other agencies with expertise like USAID and the Department of State, to include disbanding of the Iraqi military, resulting in a massive security burden and hundreds of thousands of unemployed, armed men who began looting and committing widespread crime.[40]

It is interesting to note that the DoD's largest concern was an insurgency, but in fact the first major security issues were crime, not insurgency. After taking over the country, the DoD planned for insurgent attacks on oil supply with the potential for oil fires to be lit by Iraqi insurgents. They were greatly surprised when only nine oil fires were recorded.[41] Instead of insurgent attacks on oil pipelines, major banks were looted and safety deposit boxes stolen. Of Iraq's largest banking chain, only two of the 170

36. Bowen, *Hard Lessons: The Iraq Reconstruction Experience*, 88–89.

37. Ibid.

[38] James Dobbins, *Occupying Iraq: A History of the Coalition Provisional Authority*, (Santa Monica, CA: RAND Corporation Press, 2009), 12.

[39] L. Elaine Halchin, "The Coalition Provisional Authority (CPA): Origin, Characteristics, and Institutional Authorities," *CRS Report for Congress*, June 6, 2005, at: http://www.fas.org/sgp/crs/mideast/RL32370.pdf, 1 (accessed December 8, 2010).

40. Bowen, *Hard Lessons: The Iraq Reconstruction Experience*, 76–77.

41. Ibid., 137.

banks remained open.[42] Post-war looting among the oil sector continued for ten weeks, causing almost a billion dollars in damage.[43] High crime rates continued for years, with as recently as 2006 Iraqis listing crime as their top concern, even beyond the insurgency and terrorism that had begun to take hold in the country.[44] In this regard the "Surge" and eventual capacity building of Iraqi military and security forces helped reverse this trend, but only after years of squandered opportunities.

To add insult to injury, the CPA had difficulty deciding to fund and support Iraq's state-owned enterprises (SOEs), which were the "sole providers of essential public utilities and the leading providers of a large number of public goods and services as well as of consumer and industrial products."[45] The CPA was concerned that more money was owed than actually at hand and the debt between enterprises was unverifiable. Therefore, the CPA made the controversial decision against the recommendation of many in the Treasury Department to freeze SOE funds while also cancelling SOE debts. By August only one-third of the SOEs were operational.[46] Once again, Iraqis were not included in the process.

The coalition began to realize the oil industry could not fund Iraq nation-building. Reconstruction cost estimates for 2004 were $35 billion, while oil revenues were less than $13 billion. Therefore, the CPA began lobbying congress for significant additional funding.[47] However, once again this process was isolated, and USAID was shut out. USAID was critical, since CPA plans focused heavily on "building things" and not institutions.[48] One could build infrastructure projects, but who would operate and

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42. Bowen, *Hard Lessons: The Iraq Reconstruction Experience*, 86.

43. Ibid., 60.

[44] Robert Perito, "Policing Iraq: Protecting Iraqis from Criminal Violence," United States Institute of Peace, June 2006, at: http://www.usip.org/publications/policing-iraq-protecting-iraqis-criminal-violence (accessed December 8, 2010).

45. Bowen, *Hard Lessons: The Iraq Reconstruction Experience*, 90.

46. Ibid., 91–93.

47. Ibid., 98.

48. Ibid., 100.

maintain them once built? The view of Iraqi citizens had grown more myopic as the wheel of violence, through crime and sectarian attacks, swept the country and fed on itself.

The CPA also requested more funds from international donations. Under the UN's International Reconstruction Fund Facility (IRFF), the United States funded an additional $18.7 billion, while outside countries pledged an additional $13.5 billion. However, this was not as extensive or supportive as hoped due to worsening security and a lack of support among leading nations like Germany, France and Russia.[49] The CPA stood up an office called the Program Management Office (PMO) to manage U.S. contributions to the IRFF, but due to interagency rivalry (between the CPA, USACE, and USAID) and a cumbersome contracting process, only two percent of the funds were spent on reconstruction by the time the CPA was closed in 2004.[50] This problem continued, albeit under different circumstances, through the transition of the Iraqi government to the end of 2006, with Iraqi ministries spending just 17 percent of their capital budgets. However, the coalition leveraged imbedded civilians, many of Iraqi origin, to help the bureaucracy make major spending decisions. By 2007 this statistic had jumped to 51 percent, although it was not spent uniformly across Iraq's provinces.[51]

In conclusion, the coalition entered Iraq without the necessary security or measures to prevent crime or corruption, which reduced institutional capacity to effectively invest capital in nation-building. As the Solow model describes, this jump in crime, violence and corruption significantly lowered the amount of capital which could be effectively invested in Iraq's reconstruction, squandering the most critical window of opportunity right after invasion and through the first years of occupation. Iraq still faces regular terrorist attacks and high crime rates. Fortunately, the United States can learn from these mistakes for future operations, working to reduce or prevent crime and corruption in nation-building operations. Cyberspace can help in this effort.

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49. Bowen, *Hard Lessons: The Iraq Reconstruction Experience*, 103.

50. Ibid., 114.

51. Ibid., 268.

2.   Corruption and Transnational Terrorism

In failing states, as economic growth declines and people grow more myopic, they look to gain what they can in the present, which increases corruption. This increased corruption furthers the cycle of violence on many fronts. It increases the risk to investment since a portion of the investment will not be going to where it was intended. It also increases the transaction costs of doing business by driving up prices to account for depreciation through crime as well as corruption through skimming, leading to a decline in foreign investments and state revenues. This weak economy in a weak state fosters terrorism.

Although it often gets little attention in the media, it is difficult to overstate the important link between corruption and state weakness. Perhaps the best statement comes from the World Bank in 2004, which reported: "The Bank has identified corruption as the single greatest obstacle to economic and social development. It undermines development by distorting the rule of law and weakening the institutional foundation on which economic growth depends."[52] This came on the heels of a decade of work by Transparency International (TI), a global coalition dedicated to fighting corruption which has worked closely with the World Bank and intergovernmental agencies since 1993.[53] TI defines corruption as "the abuse of entrusted power for personal gain."[54]

When the word "corruption" is mentioned, it is often used synonymously with bribery. The U.S. Department of State groups corruption and bribery together.[55] When corruption is equated to bribery, many may think of low-ranking officials passing bribes under the table, while others perhaps think of high-ranking politicians who use their power to get perks and handouts from lobbyists or other government agencies.

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52. David Chaikin, *Corruption and Money Laundering: a Symbiotic Relationship*, (New York, NY: Palgrave Macmillan, 2009), 11.

53. Ibid., 12.

54. Text from Transparency International "Frequently Asked Questions" website at: http://www.transparency.org/news_room/faq/corruption_faq (accessed September 14, 2010).

55. Text from the U.S. Department of State "Corruption and Bribery," at: http://www.state.gov/e/eeb/cba/gc/ (accessed October 5, 2010).

In actuality, the idea of corruption can be far more sinister and have much more dire consequences to national security than the above examples, which is why the World Bank placed such a heavy emphasis on the problem of corruption in 2004. USAID agreed, stating a year later in its 2005 Anticorruption Strategy report that "an international consensus has now emerged that corruption and poor governance fuel state failure, deter foreign investment, and cripple economic growth and development."[56] Therefore, it is safe to say that corruption can go beyond mere bribery or nepotism, with consequences that predispose the entire state toward failure, thereby increasing the risk of terrorism within that state, and make any nation-building effort far more difficult.

However, in today's globalized environment, with the Internet and interconnectedness like never before, even state-failure can be an understatement. Corruption can have further implications beyond its own national borders, to include threatening the United States through transnational terrorism. It can also affect far more than only the economy and development. To make this conclusion, one need only to consider the most significant threat to U.S. National Security-- the use of WMD against the state-- where corruption would likely play a significant role.

What if even a handful of the guardians of nuclear knowledge or material in a weak state are corrupt, leading to a terrorist organization's acquisition of WMD? In such a scenario, the threat of WMD against the United States would not be found in the nations who possess them, but rather in those nations losing control of WMD to terrorists bent on a radical agenda of attacking the United States and its interests and allies. This caries even more threat, since terrorists may not concern themselves with a non-conventional U.S. counter-attack. Who would the U.S. retaliate against, if the state itself did not authorize any use of WMD against the U.S.? Unfortunately, this is not a fictional idea, but a very real and present danger in the twenty-first century. There are two solid examples of how corruption has increased the risk of nuclear weapons being employed against the U.S. in weak or failing states. In South Africa, weapons-grade nuclear material   was

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56. Text from "USAID Anticorruption Strategy," Washington D.C., January 2005 at: http://www.usaid.gov/our_work/democracy_and_governance/publications/pdfs/ac_strategy_final.pdf (accessed September 28, 2010).

almost stolen. In Pakistan, weapons-grade nuclear material, knowledge and equipment were sold to the highest bidder. These cases, along with Nigeria, are covered in chapter III.

II.   CYBERSPACE AS SOFT POWER TOOL AGAINST CRIME: E-MONEY

The importance of reducing crime in weak states and its potential to contribute to transnational terrorism was seen in Iraq. Therefore, how might cyberspace be utilized to combat crime and spur investment in weak states where similar conditions exist, such as high crime and corruption, and therefore reduce the threat of developing transnational terrorism? One application which shows promise is electronic money, or e-money. Once money exists electronically, it can circumvent criminals who tend to use physical cash due to its portability and inherent lack of accountability.

E-money now exists in mobile phone networks. This is critical, since as already noted in the introduction, 90 percent of the entire world has access to cell phones today, and coverage is accelerating in the developing world. When discussing e-money specific to mobile phones, it is often called "mobile money." Mobile money is expanding rapidly in developing nations like Kenya, with promise for the future in other developing countries.[57]

E-money brings another benefit, in that it can be implemented in areas that do not have vast infrastructures because modern technologies do not require power lines or phone lines. Today, electronic currency can travel directly through cell phones, with a tower to service thousands of phones with data services to the Internet, bringing voice and data capabilities to extremely rural areas. This was the case most recently in Haiti, where mobile generators were used by Haitians to charge cell phones and maintain cell phone towers, even when Port Au Prince was without power and mostly in ruins due to the massive Earthquake in 2010.[58]

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57. Khanvi Magubane, "Mobile Money Grows in Africa," *Media Club South Africa*, 8 June 2009 at: http://mediaclubsouthafrica.com/index.php?option=com_content&view=article&id=1172:mobile-money-grows-in-africa&catid=48:innovation_news&Itemid=115 (accessed April 23, 2010).

58. David Ovalle, "Charging Cellphones Is A Moneymaker in Haiti," *The Seattle Times*, January 27, 2010 at: http://seattletimes.nwsource.com/html/nationworld/2010910268_haiti28.html?syndication=rss (accessed October 23, 2010).

For effective evaluation of e-money's effect on crime, however, quantitative data needs to be obtained and analyzed. Perhaps the best case study for e-money in a weak state with active transnational terrorism organizations may be found in Kenya. Kenya has already proven its vulnerability to transnational terrorists with its links to Al Qaeda and the bombing of the U.S. embassy in its capitol city of Nairobi in 2002.[59] Furthermore, Kenya is ranked low in the Human Development Index (HDI) as a weak state with limited infrastructure and high crime. Kenya has also been aggressively pursuing mobile money since 2007. However, this mobile money only exists in specific areas covered by mobile phones. Kenya can therefore be examined in a natural experiment to see if there is a difference between the trends in crime where mobile phones, and therefore mobile money, exist, as compared to trends in crime where there are no mobile phones or mobile money.

A.   MOBILE MONEY'S EXPANSION IN KENYA

Mobile money in Kenya was launched in March of 2007 through its largest cell phone carrier, Safaricom.[60] It was touted as a "24 hour teller through your cell phone" and called M-Pesa after the Swahili word "Pesa" for cash.[61] M-Pesa, to a Kenyan, literally means "mobile money." It is extraordinarily simple, requiring no bank account and only the cheapest of cell phones (no smart phone required).[62] Most Kenyans can take physical currency and turn it into a Safaricom representative, who collects the cash and turns it into credit on their phone account.[63] This can then be transferred to any other

[59] Frank Gardner, "Al-Qaeda Claim Kenya Attacks," *BBC News*, December 3, 2002, at: http://news.bbc.co.uk/2/hi/africa/2537107.stm (accessed November 27, 2010).

60. Nick Hughes and Susie Lonie, "M-Pesa: Mobile Money for the 'Unbanked' Turning Cellphones into 24-Hour Tellers in Kenya," *Innovations*, Winter/Spring 2007, at: http://www.changemakers.com/pt-br/system/files/Innovations%20Article%20on%20M-Pesa_0.pdf, 63, (accessed October 23, 2010).

61. Ibid.

62. Ibid., 70.

63. Ibid., 63.

phone account. The receiver can then use this credit to either pay his or her own phone

bill or turn it in to another Safaricom representative for physical currency again. It is also

secure, using a PIN as do ATMs.[64]

It was effective in being adopted by a vast amount of Kenya's population of over

40 million people.[65] Within the first month, Safaricom registered over 20,000 users, far

ahead of expectations.[66] By June 2008, there were 2.3 million registered M-Pesa

customers.[67] By July of 2009, the number of customers had grown to over 7 million.[68]

By November 2009, the total had reached over 9 million customers, and by October 2010

there were 12.5 million M-Pesa customers.[69, 70]
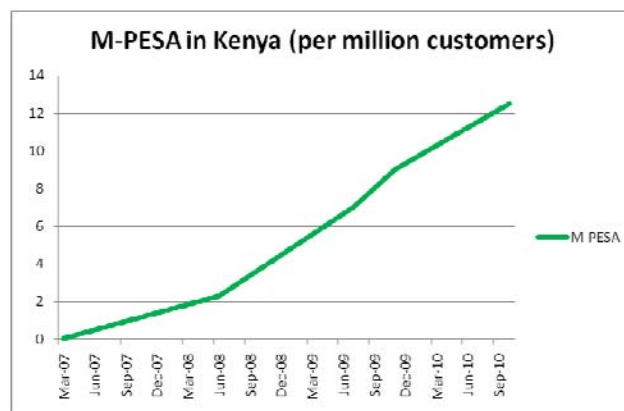
Figure 4.   M-Pesa Customer Growth Over Time, 2007–2010

64. Hughes and Lonie, "M-Pesa: Mobile Money."

65 Text from the Central Intelligence Agency website, "Kenya," The CIA World Factbook, at:
https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html (accessed November 27, 2010).

66. Hughes and Lonie, "M-Pesa: Mobile Money for the 'Unbanked' Turning Cellphones into 24-Hour
Tellers in Kenya," 63.

67. Jim Rosenberg, "Why has M-Pesa Become So Popular in Kenya?" *CGAP.org*, June 17, 2008, at:
http://technology.cgap.org/2008/06/17/why-has-m-pesa-become-so-popular-in-kenya/ (accessed October
23, 2010).

68. Text from Vodafone, "M-Pesa in Partnership with Grundfos for Rural Water Provision,"
September 4, 2009, at:
http://www.vodafone.com/start/about_vodafone/what_we_do/vmt/news/grundfos.html (accessed October
23, 2010).

69. Ignacio Mas and Dan Radcliffe, "Mobile Payments Go Viral: M-PESA in Kenya," World Bank,
May 2010, at: http://www.pymnts.com/mobile-payments-go-viral-m-pesa-in-kenya/ (accessed October 23,
2010).

70. Victor Juma, "Kenya: Uchumi Clients to Buy Goods Using M-Pesa Mobile Money,"
Allafrica.com, October 25, 2010, at: http://allafrica.com/stories/201010240045.html (accessed October 25,
2010).

Using the most recent estimated Kenyan population growth rate of 2.6 percent per year, it is interesting to see how the number of M-Pesa customers is growing within the context of the total population of Kenya.[71] This estimation is subject to some error, since an unknown portion of M-Pesa customers may own multiple M-Pesa accounts. However, it is thought that this number is minimal, since having multiple accounts incurs a cost of multiple phone numbers with little benefit to the consumer. Therefore, assuming a single customer to single Kenyan relationship, one can see how M-Pesa is establishing itself as a common practice within Kenya.

Kenya M-PESA Statistics (in Millions)			
Date	Pop	M-PESA	M-Pesa / Cap
Mar-05	35.9	0	0.0%
Mar-06	36.8	0	0.0%
Mar-07	37.8	0.02	0.1%
Jun-08	38.7	2.3	5.9%
Jul-09	39.7	7	17.6%
Nov-09	40.7	9	22.1%
Oct-10	41.8	12.5	29.9%

Table 1.   Kenya M-Pesa Customers per Population raw data

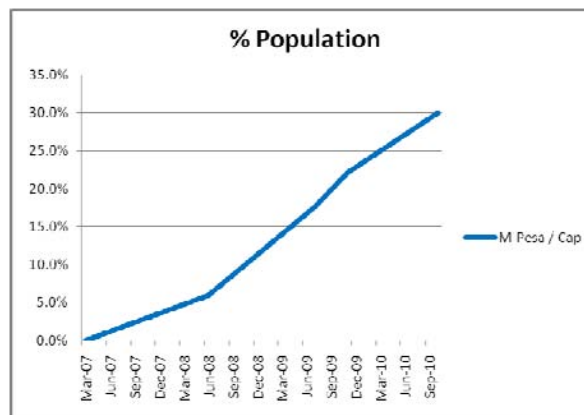
Figure 5.   Percent of Kenyan Population Using M-Pesa

71. Text from the World Bank, "World Development Indicators," 2008, at:
http://www.google.com/publicdata?ds=wb-wdi&met=sp_pop_grow&idim=country:KEN&dl=en&hl=en&q=population+growth+rate+kenya (accessed October 25, 2010).

As we can see in the figures above, using the 12.5 million customer total in October 2010, there is now almost one M-Pesa customer for every three Kenyans, assuming an estimated Kenya population of 41.8 million for 2010 (using Kenya's 2008 population data combined with Kenya's 2.6 percent annual population growth rate).[72] This is consistent with other sources, with research from MIT indicating 38 percent of Kenyan households have at least one person who uses mobile money.[73]

It should be noted that M-Pesa was not a random rollout. It was a well-engineered, concise business plan by Vodacom, sponsored by the U.K.'s Department for International Development (DFID), and therefore, in effect, a use of British soft power to boost state capacity in Kenya.[74][75] It was a highly effective partnership between public and private enterprise which produced these results.[76] Today, M-Pesa is now growing to spawn similar projects sponsored by other partnerships between private enterprise, NGOs, and public institutions. Safaricom's parent company, Vodacom, has launched the service in Tanzania and Afghanistan, with plans for South Africa in the works.[77] The Bill and Melinda Gates foundation and USAID plan to use similar concepts to implement mobile money in Haiti.[78]

Also, M-Pesa is not the only mobile money solution in Kenya. Although when it was launched it was the only service of its kind, competing cell phone companies are now launching their own mobile money services. Zain, the second largest cell phone

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72. World Bank, "World Development Indicators."

73. Peter Dizikes, "Banking on Mobile Money," Massachusetts Institute of Technology, February 23, 2010, at: http://web.mit.edu/newsoffice/2010/mobile-money-0223.html (accessed October 25, 2010).

74. Hughes and Lonie, "M-Pesa: Mobile Money for the 'Unbanked' Turning Cellphones into 24-Hour Tellers in Kenya," 63.

75. Ibid., 66.

76. Ibid., 67.

77. Text from Tech Central, "Vodacom to launch Kenya's M-Pesa in SA," February 17, 2010, at: http://www.techcentral.co.za/vodafone-to-launch-kenyas-m-pesa-in-sa/12892/ (accessed October 23, 2010).

78. Text from the Bill and Malinda Gates Foundation, "Gates Foundation and USAID Announce Innovative Fund to Incentivize Mobile Money Services in Haiti," June 8, 2010, at: http://www.gatesfoundation.org/press-releases/Pages/building-assets-with-mobile-money-service-in-haiti-100608.aspx (accessed October 25, 2010).

company in Kenya next to Safaricom, started "Zap" mobile money service in February 2009.[79] By October 2010, Zap had reached 2 million customers in Kenya.[80]

This has potential for stability operations and nation-building in weak states, since aid groups and institutions can provide financial assistance more directly to individuals without the need for government bureaucracy. However, this is beyond the scope of this thesis. What we must now examine is if such circumvention of physical currency is effective for security from a DoD perspective. In the context of Iraq, would mobile money be effective against such crimes as theft and robbery? In theory, it should be, since the only transaction that takes place is between institutions or individuals with a mobile phone and a secure PIN.

B.   MOBILE MONEY VERSUS CRIME

The overall state of economic and criminal statistics in Kenya is somewhat poor. M-Pesa is too new and has outpaced data collection, some of which is only current as of 2008 when M-Pesa was still relatively new. However, there is data that is reliable and available enough to conduct some analysis.

The Human Development Report is highly regarded as an accurate gauge of the state of a country's development. This report, published by the United Nations, rates countries on items like per capita income, education, and crime on the HDI. In the latest 2010 HDI published November 4, 2010, the United States was ranked fourth of 169 countries studied.[81] Kenya, however, was ranked 128th, placing it in the bottom quarter of developed nations under the category of "low human development" along with countries like Afghanistan and Sudan.[82] Kenya is therefore a good case to study when

79. Moses Kemibaro, "Zain Finally Launches Zap in Kenya," February 21, 2009, at: http://www.moseskemibaro.com/2009/02/21/zain-finally-launches-zap-in-kenya/ (accessed October 25, 2010).

80. Text from Zain Press Release, "Zap Customers Can Now Use PesaPoint ATMs for Cash Withdrawls," *Ratio Magazine*, October 25, 2010 at: http://www.ratio-magazine.com/201010253716/Corporate-Press-Releases/Kenya-Press-Releases-Zap-Customers-Can-Now-Use-PesaPoint-ATMs-for-Cash-Withdrawals.html (accessed October 25, 2010).

81. Text from the United Nations Development Program, "Human Development Index (HDI) - 2010 Rankings," at: http://hdr.undp.org/en/statistics/ (accessed November 5, 2010).

82. Ibid.

considering the type of country the United States may experience when conducting nation-building operations and countering terrorism in such weak states.

To explore the relationship between M-Pesa and crime, Kenyan National Police crime statistics must be used. The Kenyan National Police have made public their crime statistics from 2006 until 2008. Working with the U.S. Embassy in Nairobi, this researcher has also obtained crime statistics from 1995 until 2005, as well as 2009. Fortunately, these statistics break out total national crimes according to categories, to include economic crimes, as well as provincial crimes.

Unfortunately, the rest of Kenya's crime statistics are of poor quality. Kenyan police total national crimes per month, but specific crimes like robbery and theft are only totaled annually. Provincial data is also limited to aggregate crimes reported per year, with no separation between types of crime. Crimes are not specified at the provincial level, which would be most useful to contrast between areas of mobile phone coverage. There are also errors in summation of crimes as well as differences in some data reported. For example, the Kenyan police post crime statistics on their website that states there were 1,261 murders in 2007.[83] However, they also published a report by the commissioner of police which states there were only 1,154 murders in 2007.[84] Fortunately, there are four different reports which have equal totals for all crimes. The Kenyan commissioner report therefore appears to be the only anomaly. This thesis will therefore use the data from the other reports as posted on the Kenyan Police website.

Further research is needed to examine all Kenyan criminal statistics per region, per month, through the end of 2010 and beyond, especially given the rapid growth of mobile-money use within the population of Kenya since last year. Due to this lack of data as well as problems mentioned above, any attempt to examine Kenyan crime data will be subject to some error. However, trends may still be found when looking at the data as available.

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83. Text from Kenyan Police Crime Statistics, 2008 Report, at: http://www.kenyapolice.go.ke/crime%20statistics.asp (accessed August 15, 2010).

84. Major General H. Ali, "Annual Crime Report for the Year 2008," Kenyan National Police, 2009, at: http://www.kenyapolice.go.ke/resources/ (accessed November 5, 2010).

1. Nationwide Total Crime

Kenya's total crime has seemed relatively unchanged since the introduction of M-Pesa in 2007. It dropped significantly in 2007, held this level in 2008, but returned to near-normal levels in 2009 as Table 2 indicates:

	2005	2006	2007	2008	2009
Total Crimes	75400	72225	63028	63476	72255

Table 2.   Total Kenyan Crimes per Year, 2005–2009[85]

However, if these crimes are separated by type, one can see a pattern:

Specified Crime	2005	2006	2007	2008	2009
Murder	1260	1286	1261	1394	1404
Manslaughter	38	33	47	29	47
Rape	1365	1291	876	735	847
Assault	12715	13186	12089	11479	14189
Robbery	6936	5234	3492	3401	2938
Breaking	8454	7420	6337	6626	7053
Theft of Stock	2219	2209	1568	2269	2876
Stealing*	10509	7938	8387	9235	10100
Theft of Motor Vehicle	654	695	557	606	594
Theft of Vehicle Parts	434	355	284	308	315
Theft from Motor Vehicle	281	313	217	219	221
Theft by Servant	2874	2700	2169	2387	2732
Dangerous Drugs	6356	5821	5401	4407	5541
Handling Stolen Property	389	619	345	423	367
Corruption	107	252	177	133	158
Causing Death by Driving	211	189	199	209	301
All Other Offences	20598	22684	19622	19616	22572
Total Crimes**	75400	72225	63028	63476	72255

Table 3.   Specific Crime Totals in Kenya, 2005–2009[86]

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85. Text from Kenyan Police Crime Statistics, 2008 Report.

86. Text from the Kenyan Police Crime Statistics 2007 and 2008 reports at: http://www.kenyapolice.go.ke/resources/; also, Kenyan Police Crime Statistics, 2009 report, sent through e-mail from U.S. Embassy in Nairobi (accessed November 5, 2010).

In specific crimes, there was a considerable drop in robbery. Furthermore, if one examines the data before 2005, it can be seen that total robberies since the introduction of M-PESA in 2007 suddenly dropped to the lowest total since Kenya began recording crime statistics in 1995, then continued to drop in subsequent years. In 1995, there were 5,686 robberies reported.[87] Robberies continued a general climb to peak in 2001 at 9,180. After 2001, they began to decrease until 2006 when they were at 5,234, or about 8 percent lower than in 1995. It is likely this increase and then decrease over twelve years may have been due to traditional, cyclical factors that influence crime, such as the state of the economy and the level of police enforcement. However, after 2006 robberies experienced the steepest decline in recorded data of 33 percent by the end of 2007, and continued this decline another 15 percent by 2009: [88, 89]
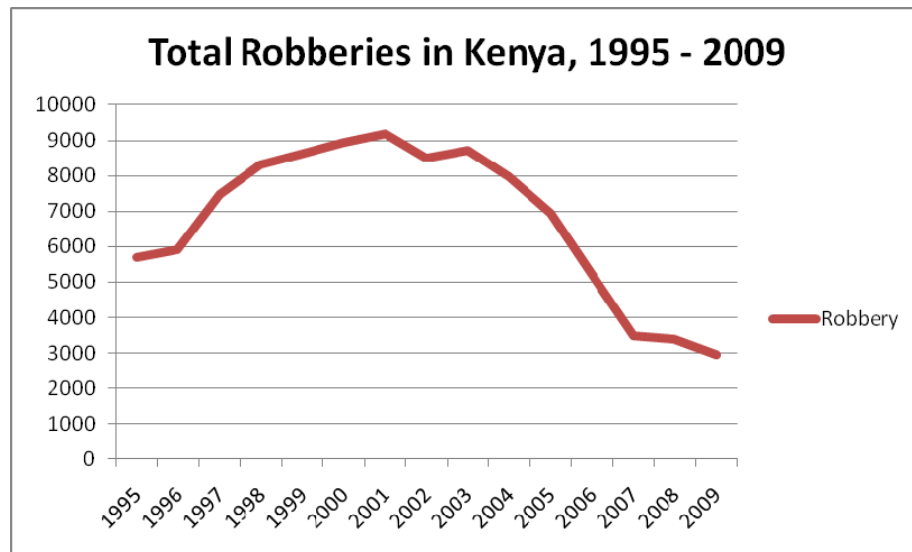

Table 4.   Kenya Total Robberies, 1995–2009[90]

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87. Text from Kenyan Police Crime Statistics, 2003 report, at: http://www.kenyapolice.go.ke/resources/ (accessed November 5, 2010).

88. Text from Kenyan Police Crime Statistics, 2007 report.

89. Text from Kenyan Police Crime Statistics, 2009 report.

90. Text from Kenyan Police Crime Statistics, 2003, 2006, 2007 and 2008 reports, at http://www.kenyapolice.go.ke/resources/; also, Kenyan Police Crime Statistics, 2009 report (accessed November 5, 2010).

There is also one key difference with M-Pesa as it relates to crime statistics, in that these crime totals cover the entire country of Kenya while M-Pesa can only be used where there is cell phone coverage. Cell phone coverage in Kenya between 2007 and 2009 only existed in very specific and well-defined areas. If one examines these areas in contrast to others, one can see a difference between crimes outside of the M-Pesa coverage area and those within.

2. Regional Crime in Mobile Areas Vs. No-Coverage Areas

Kenyan crime statistics are divided among ten regions, which constitute the eight provinces of Kenya, as well as two special areas known as "Railways" and "Kapu." Geographically, the provinces of Kenya look like this:
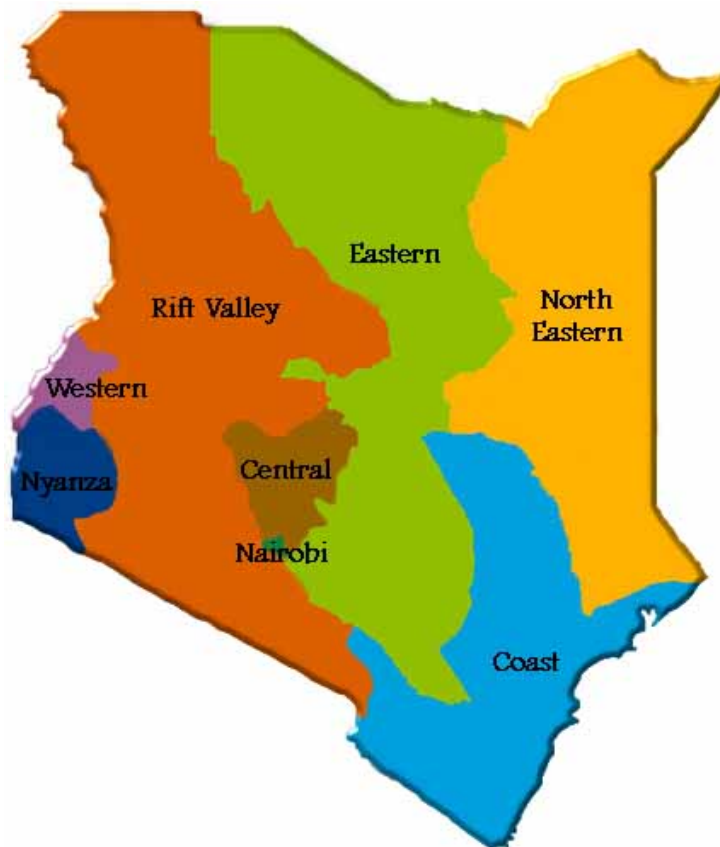

Figure 6.   Provinces of Kenya

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Safaricom's services are mostly specific to some of these provinces, as can be seen in the map below:

Figure 7.   Safaricom Coverage Map, 2009[91]
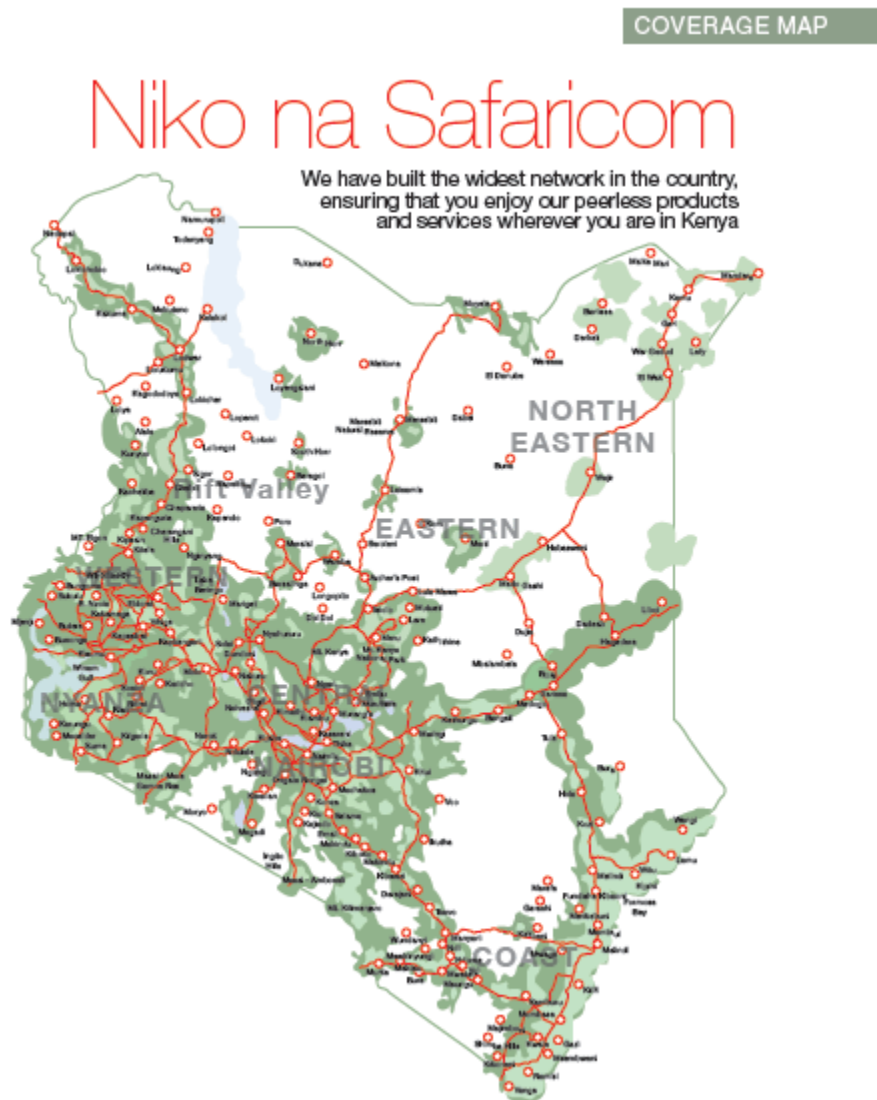
To better understand this map as it relates to each province, it is helpful to know the number of cell phone towers in each province per capita. This is a good gauge of coverage for Kenya's population per province:

91. William Jack and Tavneet Suri, "The Economics of M-PESA," Georgetown University, August 2010, at: http://www.mit.edu/~tavneet/M-PESA.pdf, 8 (accessed November 5, 2010).

Province	Towers	Population / Tower
Nairobi	584	4872
Coast	247	12046
Central	206	19048
Rift Valley	375	22448
Eastern	214	24871
North Eastern	45	29467
Nyanza	162	30771
Western	90	46122

Table 5.   Kenyan Safaricom Cell Towers, per Province and Population[92]

From the Table 5 , it is evident that the provinces of Nairobi, Coast and Central have the most cell phone coverage per population. This may now be contrasted with crime totals for each province:

Province	2005	2006	2007	2008	2009
Nairobi	12300	11302	6395	4667	4712
Rift Valley	15320	14730	12590	9945	19716
Central	12237	10900	10187	12130	9929
Eastern	9454	9812	9615	9704	10003
Nyanza	7913	7962	7756	8739	8721
Coast	8629	8601	8182	9639	9291
Western	8546	7600	7088	7402	8610
North Eastern	605	949	786	849	1020

Table 6.   Kenyan Crime Totals, per Province, per Year[93]

At first, it appears total crime data specific to the provinces most covered by Safaricom also fails to show a strong relationship between M-Pesa and total crimes reported. While M-Pesa usage grew from 2007 to 2008, crime also increased in two of the three provinces with the greatest cell phone coverage (Coast and Central). However, it should be noted that by the end of 2008, there were only a few million users of M-Pesa, and many of these were in the capital of Nairobi where it was first rolled out and advertised. Despite the wide coverage in the Central and Coast provinces, users in these

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92. Jack and Suri, "The Economics of M-PESA," 7.

93. Text from Kenyan Police Crime Statistics, 2007 and 2008 reports.

areas may have been less familiar with M-Pesa as it took hold within Safaricom. In that context Nairobi, where adoption of M-Pesa has been most prolific and where Safaricom touches the most cell phone users per capita, enjoyed a drop in crime that was quite dramatic. Crime plummeted almost 43 percent by the end of 2007 from previous years. By the end of 2008, it was down 59 percent from two years earlier before the introduction of M-Pesa. This historic low was more or less maintained in 2009, still being 58 percent lower than 2007.

Also, as M-Pesa continued to grow from 2008 to 2009, the next two most covered cell phone provinces saw similar trends. Number two Coast province saw a drop in crime of 3.6 percent between 2008 and 2009, while number three Central province saw a drop in crime of 18 percent.
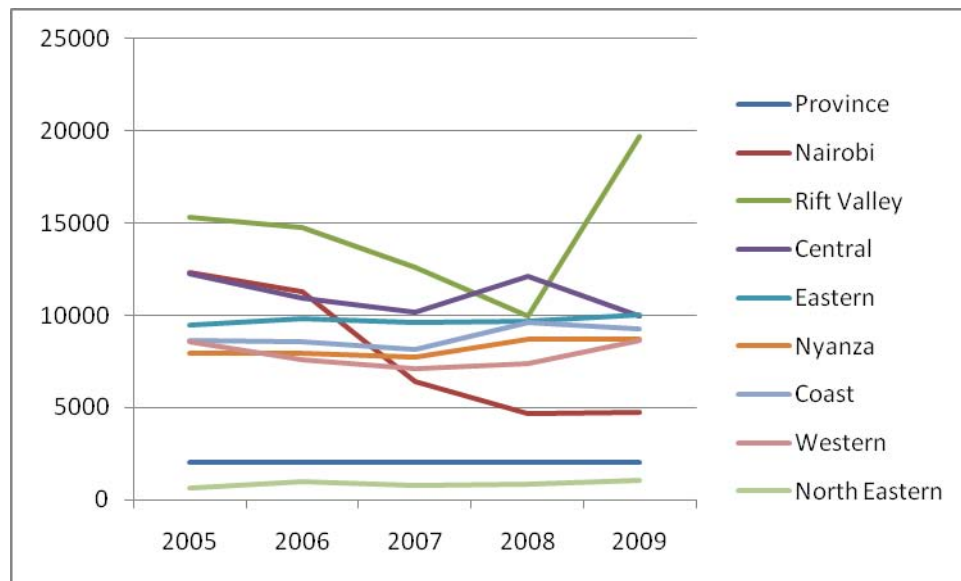

Figure 8.   Kenya Crime Trends, per Province, 2005–2009

Further research is needed in subsequent years to see if these trends continue. It would be useful to know statistics for each type of crime within each province per month through 2010, as well as how this compares with specific growth of M-Pesa usage statistics within each province. More research should be done to confirm M-Pesa's impact on crime, but so far the data is promising, especially in robbery. It can be theorized that Kenyan citizens can transfer their physical money into mobile money and

circumvent robbers as they travel throughout the country, providing a negative incentive for criminals to rob. Since strong states provide security and have lower crime rates, mobile money appears to boost state strength and security—an important goal of nation-building.

C. FURTHER IMPLICATIONS BEYOND CRIME: CORRUPTION

There is also some evidence to suggest that the use of M-Pesa may have a positive impact on corruption. Due to the success in Kenya, Vodacom and the DFID again partnered together to bring M-Pesa to Afghanistan.[94] Using the local cell phone company Roshan and calling the service "M-Piasa," they started the service in 2008.[95] Today, it is available in most major cities in Afghanistan.[96]

What is perhaps most interesting is a story that took place when the service was first rolled out. The pilot program of M-Paisa used 50 Afghan National Police, who could withdraw their money directly from Roshan or transfer it to anyone else using M-Paisa.[97] Chris Bold, writing for the Consultative Group to Assist the Poor (CGAP), states:

> The trial was a success, despite having to overcome some initial challenges such as a police commander who wanted the service shut down, as he was no longer receiving his usual cut of the salaries. The police officers were initially surprised at how large the payments were when they received their full salary, which was a third higher than what they were used to receiving.[98]

In just one province, among 50 of the first police to use the service, the transparency that mobile money brought revealed that all of the police were having a third of their salary stolen by their commander. It therefore comes as little surprise when

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94. Chris Bold, "In Afghanistan, Going Where No Bank Has Gone Before," *CGAP*, January 19, 2010, at: http://technology.cgap.org/2010/01/19/in-afghanistan-going-where-no-bank-has-gone-before/ (accessed October 25, 2010).

95. Ibid.

96. Ibid.

97. Ibid.

98. Ibid.

we hear of the lawlessness and corruption of Afghan police, who must make their money through other means when a legitimate salary is beyond their reach.

E-money has also exposed outright theft by more officials in Afghanistan where widespread corruption is a serious problem. A few years ago, nearly 94 percent of Afghan police training records reported problems with paying police, despite the U.S. government paying the force on time.[99] Upon further examination, it was discovered that superior officers were "skimming" from the pay of those under them, so that many police were going months without pay while those above them grew rich. Subsequently, the United States implemented Electronic Fund Transfers (EFTs) instead of cash transactions, enabling officers to receive their pay directly through the bank of their choice without interference from their chain of command. Today, all Afghan provinces are using EFTs, and 57 percent of the police force is receiving this money, a significant improvement from a few years earlier.[100] This number should continue to increase in subsequent years as EFTs becomes more understood and widely used in Afghanistan.

This problem is not exclusive to the lowest levels of Afghanistan, which has frequently struggled to pay its police due to corrupt officials skimming the physical currency of troops before they are paid. This problem exists at the highest levels of the Afghan government as well, with millions of dollars in bags of physical cash going directly to the President of Afghanistan himself.[101] President Karzai assures everyone this money goes to his people, but where is the audit trail to prove it? It is difficult to achieve the level of transparency and accountability when using bags of physical cash.

It is not enough to pay security well, but security must be paid effectively also, ensuring the salaries given them are the payments they receive. Mobile money can help to achieve this by bringing transparency to the payment process, reducing corruption in

99. Anthony Cordesman, David Kasten, and Adam Mausner, *Winning in Afghanistan: Creating Effective Afghan Security Forces*, (Washington D.C., Center for Strategic and International Studies, 2009), 121.

100. Ibid.

101. Foxnews.com, "Karzai Admits Receiving 'Bags of Money' from Iran," October 25, 2010, at: http://www.foxnews.com/world/2010/10/25/karzai-admits-receiving-bags-money-iran/ (accessed October 25, 2010).

the system, and increasing the rationality of the security system. This may have wide-ranging implications for security in states, such as Pakistan, with high corruption indices that also possess WMD while struggling with transnational terrorism.

As crime and corruption are reduced with e-money, it is likely to have a positive impact on the weaker state with high crime and corruption. E-money may then help the state transition to being a stronger state by lowering crime and corruption. In theory, this would also make states less vulnerable to harboring transnational terrorists. E-money, as a soft power technique, would therefore be an effective cyberspace tool to be used in addition to more traditional military security to raise state capacity and lower the threat of transnational terrorism to the United States and its allies.

III.   CORRUPTION AS SECURITY RISK

This paper will now establish corruption's relationship to nation-building, state weakness, and transnational terrorism, as well as to the threat of transnational terrorists to acquire WMD.   Before one can discuss fighting corruption in cyberspace, one must understand the mechanisms of corruption thoroughly by examining cases which describe how corruption has been produced and maintained.   To do this, it is helpful to more closely examine weak states with high corruption and links to crime and terrorism, such as South Africa and Pakistan, as well as other weak states like Nigeria.

A.   SOUTH AFRICA

South Africa's electrical infrastructure relies almost 90 percent on coal, which is relatively cheap in South Africa due to its abundant supply.[102, 103]   Nuclear power only provides between five and seven percent of the electrical power needed in South Africa.[104,105]   Of that nuclear power, all of it comes from a single plant in the south at Koeberg which uses Low Enriched Uranium (LEU) as fuel.[106,107]   South Africa also has a second nuclear reactor near Pretoria called Pelindaba or SAFARI-1, but this does not produce electrical power directly; it uses Highly Enriched Uranium (HEU) to produce fuel for the Koeberg plant as well as some additional research.[108]   If looking at the total

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102. Text from "Eskom: Power Struggles Far from Over," *South Africa Magazine*, November 30, 2010, at: http://www.southafricamag.com/content/eskom-power-struggles-far-over (accessed December 1, 2010).

103. Text from Eskom website, "Generating Electricity," at: http://www.eskom.co.za/live/content.php?Item_ID=5625 (accessed September 12, 2010).

104. Text from the World Nuclear Association website, "Nuclear Power in South Africa," November 2010, at: http://www.world-nuclear.org/info/inf88.html (accessed December 1, 2010).

105. Text from MBendi.com, "Electrical Power in South Africa Overview," MBendi Information Services, at: http://www.mbendi.com/indy/powr/af/sa/p0005.htm (accessed September 9, 2010).

106. Ibid.

107. Text from Carnegieendowment.org, "South Africa," Carnegie Endowment for International Peace, at: http://carnegieendowment.org/files/Tracking_SAfrica.pdf (accessed September 12, 2010).

108. Text from Global Security.org, "Pelindaba Nuclear Research Center," Global Security.org at: http://www.globalsecurity.org/wmd/world/rsa/pelindaba.htm (accessed September 12, 2010).

energy requirements of the entire country (such as automobiles, industry, and the like), nuclear power shrinks further in importance, only fulfilling 2.2 percent of South Africa's complete energy requirements.[109]

The chief decision makers in South Africa's power infrastructure are the South African government and South Africa's state power company, Eskom. Control is mostly a public enterprise between the government and Eskom, which is a state-owned, heavily regulated company. Private and military involvement is minimal. South Africa only has 63,000 personnel in its military.[110] The state employs contract security guards through a company called the Nuclear Energy Corporation of South Africa (NECSA) to keep watch over the most critical areas.[111] The most protection offered in the entire system is for the Pelindaba facility, which houses the HEU. This facility is protected by closed-circuit television cameras inside a secure control room surrounded by three layers of triple fencing (including a 10,000 volt electrical fence) and "other security measures."[112] However, the guards are still private security guards, not military men and women.

Beyond the usual consumers and industry that rely on electrical power, stakeholders also include infrastructure systems that rely on a steady flow of electricity, such as transportation, banking, and hospitals. The stakeholders are not limited to South Africa, though; in fact, it is staggering how many stakeholders there are when it comes to South Africa's power supply. Eskom also supplies 45 percent of the power to the entire continent of Africa, most of it in the southern region.[113] Therefore, what affects South African power, and the decisions South Africa and Eskom make toward that power, have

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109. Text from the Department of Energy website, "South Africa- Background," U.S. Energy Information Association, at: http://www.eia.doe.gov/cabs/South_Africa/Background.html (accessed September 9, 2010).

110. Text from NationMaster.com website, "South Africa- Military," NationMaster.com, at: http://www.nationmaster.com/country/sf-south-africa/mil-military (accessed September 16 2010).

111. Adriana Stujit, "South Africa Cannot Protect Its Nuclear Stockpile," *Digital Journal*, December 22, 2008 at: http://www.digitaljournal.com/article/263843 (accessed September 9, 2010).

112. Ibid.

113. Text from Eskom website, "Company Profile," Escom.com at: http://www.eskom.co.za/live/content.php?Category_ID=59 (accessed September 12, 2010).

an impact on much of the entire continent of Africa. Conversely, energy demands in other African states influence South Africa's decisions. It is likely that energy demands will continue to grow.

In 2007, "technically sophisticated criminals" attacking in two separate waves breached all security at the Pelindaba nuclear facility in South Africa and had complete control of the facility for 45 minutes.[114] They escaped unscathed and were never found. Given that Pelindaba at the time contained hundreds of kilograms of weapons-grade HEU, these criminals could have obtained the fissile material needed to build over a dozen nuclear bombs (HEU can be detonated in a nuclear explosion with conventional bombs, unlike plutonium; therefore, once you have the fissile material, the rest is relatively easy).[115] [116] Amazingly, this attack occurred two years after a previous attack, so that by 2007 the security in the Pelindaba facility was already elevated higher than when the previous attack had occurred. Fortunately, no HEU was stolen before a wounded security guard triggered the alarm and the criminals were forced to flee.[117] However, one must ask how this attack could take place after a previous attack and with heightened security.

The most likely scenario is that of corrupt guards, an idea first proposed by the same guard who called police. The guard reported that security reinforcements were only three minutes away, yet they did not respond for 45 minutes. It is entirely possible that bribed guards were instrumental in almost allowing the theft of enough HEU to build a dozen nuclear bombs.[118] There remain serious concerns that this facility is still not

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114. CBS News, "Nuke Facility Raid an Inside Job?" *60 Minutes*, November 23, 2008, at: http://www.cbsnews.com/stories/2008/11/20/60minutes/main4621623.shtml, 1 (accessed June 10, 2010).

115. Ibid.

116. Graham Allison, *Nuclear Terrorism*, (New York, NY: Owl Books, 2005), 95.

117. Micah Zenko, "A Nuclear Site Is Breached," *The Washington Post*, December 20, 2007, at: http://www.washingtonpost.com/wp-dyn/content/article/2007/12/19/ AR2007121901857.html (accessed May 17, 2010).

118. CBS News, "Nuke Facility Rain an Inside Job?" 1.

secure, especially since the second attack progressed even further than the first, and the consequences of the second attack have yielded no arrests and only the firing of three security guards (with no criminal probe).[119]

Corruption in South Africa is not uncommon. TI reports that South Africa's Corruption Perception index (CPI) has been steadily progressing in the wrong direction for the past decade. In 2001, South Africa was the 38th least corrupt nation in the CPI.[120] By 2005, it had dropped to 46th.[121] Last year, it had dropped further to 55th.[122] Given these figures and the history outlined above, it is highly likely that these nuclear plants are becoming less secure, not more, as corruption grows.

Currently, South Africa has a population over 49 million people and a GDP per capita of $10,600.[123] [124] Although many consider it the most developed country on the continent of Africa, it actually ranks seventh in GDP per capita on the list of African countries. For comparison, Equatorial Guinea's GDP per capita is $44,100 and Botswana's is $14,700.[125] However, if one looks more in depth beyond mere GDP into the quality of life and life expectancy, South Africa ranks far lower. The HDI in 2009 ranked South Africa 128th in the world, behind other African countries like Botswana, Egypt and Tunisia.[126]

South Africa used to rank much higher, but has been steadily trending down in these statistics for over ten years. In 2005 South Africa was 120th on the HDI list, while

119. Stujit, "South Africa Cannot Protect Its Nuclear Stockpile."

120. Text of the Corruption Perceptions Index 2001 on Transparency International's Web site at: http://www.transparency.org/policy_research/surveys_indices/cpi/2001 (accessed August 10, 2010).

121. Text of the Corruption Perceptions Index 2005 on Transparency International's Web site at: http://www.transparency.org/policy_research/surveys_indices/cpi/2005 (accessed August 10, 2010).

122. Text of the Corruption Perceptions Index 2009 on Transparency International's Web site at: http://www.transparency.org/policy_research/surveys_indices/cpi/2009/cpi_2009_table (accessed August 10, 2010).

123. Text from the Central Intelligence Agency website, "South Africa," The World Factbook, August 19, 2010 at: https://www.cia.gov/library/publications/the-world-factbook/geos/sf.html (accessed September 9, 2010).

124. Click Afrique, "Africa's Ten Richest Countries of 2007," January 17, 2010 at: http://www.clickafrique.com/Magazine/ST014/CP0000002793.aspx (accessed September 12, 2010).

125. Ibid.

126. Text from the UN Development Program website, "Human Development Report 2009," UN Development Reports, at: http://hdr.undp.org/en/statistics/ (accessed September 12, 2010).

in 2000 South Africa was 103rd.[127] [128] Over the past ten years, South Africa has dropped below 25 countries in human development. Its HDI raw number has also dropped as well almost every year since 1990.[129] Possible reasons South Africa is dropping in these indices is its status as a transitional weak state, as indicated by its retarded development, high crime, and growing corruption. Its infrastructure has been deteriorating, especially its electrical infrastructure which has been in steady decline for years. The CIA states:

> At the end of 2007, South Africa began to experience an electricity crisis. State power supplier Eskom encountered problems with aged plants, necessitating "load-shedding" cuts to residents and businesses in the major cities… Unemployment remains high and outdated infrastructure has constrained [GDP] growth.[130]

In 2008, power disruptions became so frequent that it threatened South Africa's hosting of the World Cup, forcing the government to declare a "national emergency."[131] Service delivery and capacity may continue to deteriorate further, since South Africa's rich coal reserves are predicted to shrink in the next 20 to 50 years, requiring an alternative form of energy.[132] The South African government and Eskom now plan to reduce coal burning from 87 percent to fewer than 70 percent of the total source of power by 2025. To do this, they plan to boost nuclear power production, until it is projected to produce 25 percent of the power needed—a five-fold increase from the nuclear power they currently produce.[133]

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127. The UN Development Program, "Human Development Indicators," Human Development Report 2005, 221.

128. The UN Development Program, "Human Development Indicators," Human Development Report 2000, 159.

129. Human Development Report 2009, "The Human Development Index" South Africa, 2009 at: http://hdrstats.undp.org/en/countries/country_fact_sheets/cty_fs_ZAF.html (accessed October 18, 2010).

130. Central Intelligence Agency, "South Africa."

131. CNN Money, "Power Outages Roil South Africa," January 29, 2008 at: http://money.cnn.com/2008/01/25/news/international/soafrica_powerout/index.htm?postversion=20080125 11 (accessed September 14, 2010).

132. Irma Venter, "For How Much Longer Can South Africa Depend on Its Power Needs?" *Mining Weekly*, April 21, 2006 at: http://www.miningweekly.com/article/for-how-much-longer-can-south-africa-depend-on-coal-for-its-power-needs-2006-04-21 (accessed October 10, 2010).

133. World Nuclear Association, "Nuclear Power in South Africa."

As stated previously, South Africa's CPI has also grown worse the past ten years, in direct correlation with their worsening HDI. At this point, it is unknown if corruption could be causing this decline in South African development, or if corruption is the result, or a combination of both. What may be said, however, is that there appears to be a strong correlation between the two, since both have been declining together for a decade.

What is interesting to note at this point, however, is that this trend follows the opposite of South Africa's GDP per capita, which has actually been growing considerably the past ten years, despite its worsening HDI and CPI. From 2000 to 2010, South Africa's GDP per capita grew from roughly $6,300 to $10,100—a growth of over 60 percent.[134] This seems to be a paradox: How can South Africa grow richer over a decade while its quality of life goes down and its corruption increases? It seems to defy conventional wisdom that corruption, which acts as a tax on transactions with no public goods supported by that tax, would coincide with an increase in wealth, since according to TI the countries with the least corruption are also the richest and most economically developed, like Norway, Australia and the United States.[135]

The answer is likely found in the fact that GDP per capita is only an average per person. In simple terms, this means if the wealthy minority grows wealthier, while the majority who are not wealthy stay the same, then the GDP per capita will increase despite the fact that the majority will have noticed no increase to their standard of living. This can become even more pronounced if the richest class grows wealthier in total and at a faster rate while the middle class actually grows poorer. In fact, the poorer and middle classes may feel more disgruntled, seeing decreasing opportunity to improve their economic standing when compared to those who already have wealth.

There is a measurement that exists to examine this data, invented by an Italian statistician named Corado Gini, representing the degree of inequality in a society's economic distribution. This statistic, called the Gini coefficient, is measured on a scale

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134. Text from Trading Economics.com website, "South Africa GDP Per Capita (PPP)," at: http://www.tradingeconomics.com/Economics/GDP-Per-Capita-PPP.aspx?Symbol=ZAR (accessed October 11, 2010).

135. Transparency International, "Corruption Perception Index 2009."

of zero (being minimum inequality) to one (being maximum inequality).[136] The UN maintains a list of the Gini coefficients of all states as part of its HDI under the Development Program. If a nation has a high Gini coefficient, it actually pulls down its HDI. The Gini coefficient in states where only a few control all of the wealth is extremely high, close to one. Many of these are weak states. On the opposite end of the scale, in the developed world where large middle classes are the norm, states have lower Gini coefficients. When looking at the latest Gini coefficients published by the UN's Development Program, one sees countries like Germany and the Scandinavian countries ranking in the top 10, with the lowest Gini coefficients under 0.29, and therefore the most economic opportunity and equity in society. Conversely, countries like Haiti and Colombia with high crime and corruption indices, and thus weak states, rank the worst with the least economic opportunity and equality and Gini coefficients above 0.58.[137] Interestingly, South Africa ranks just above Colombia and Bolivia in 2007 at 134th, with a high Gini coefficient of 0.578.

Despite the strong GDP per capita growth South Africa has experienced, its Gini coefficient has deteriorated over time, decreasing opportunities to the middle class. Bhorat and Kanbur state that South Africa's Gini coefficient rose steadily (meaning growing more unequal) from a national Gini coefficient of 0.68 in 1975 to 0.73 in 2001.[138] Bhorat and Kanbur also break this figure down into the major ethnicities in South Africa and show an increasing Gini coefficient for all, to include blacks as well as whites.[139] Although calculating the Gini with slightly different methods, and therefore getting slightly different results, the CIA supports the claim that South Africa's inequality has been rising. The CIA stated that South Africa's Gini coefficient has risen from 0.593 in 1994 to 0.65 in 2005, a troubling increase. Finally, it should be noted that Bhorat has continued to publish information on South Africa's Gini coefficient, stating last year that

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136. Bernard Cloutier, "Gini Coefficients," at: http://www.berclo.net/page01/01en-gini-coef.html (accessed October 11, 2010).

137. Text from the UN Development Program website, "Human Development Reports," at: http://hdrstats.undp.org/en/indicators/161.html (accessed October 11, 2010).

138. Haroon Bhorat and S.M. Ravi Kanbur, *Poverty and Policy in Post-Apartheid South Africa*, (Cape Town, South Africa: HSRC Press, 2006), 101.

139. Ibid.

the Gini had risen further to 0.679, which would place South Africa near the bottom of the list of countries in the UN's HDI Development Program.[140]

The statistical trends seem to indicate that Gini coefficients are high among weak states, with some relationship to corruption. Weak states with higher Gini coefficients seem to also produce lower rankings on the CPI and HDI. As corruption and the Gini coefficient increase, while the HDI decreases, states tend to grow weaker, making them more vulnerable to terrorism. If one of these indicators could be positively influenced, such as reducing crime or improving the Gini coefficient, then this could have a positive effect on the weak state and produce a reduction in its capacity to harbor transnational terrorism. Reducing corruption or increasing the Gini coefficient would likely reduce grievances by citizens who see less economic opportunity, improving the state's vulnerability to anti-state activities like crime and transnational terrorism. This may be done in cyberspace.

B.   PAKISTAN

Another example of corruption and its potential implications toward the spread of WMD is Pakistan. TI ranks Pakistan among the top 50 most corrupt countries in the world, and the situation is deteriorating. Pakistan's corruption index has increased over 400 percent in the past three years, Making it as of 2010 the 35th most corrupt nation on the planet according to the CPI.[141] [142] Even worse, in 2010 Pakistan's police were rated the most corrupt of all government services, making them the most corrupt of the

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140. Text from MyWage website, "Wage Gap Between Rich and Poor Widens," September 2009, at: http://www.mywage.co.za/main/news/mywage-south_african-news/wage-gap-between-rich-and-poor-widens-2013-september-2009 (accessed October 11, 2010).

141. Sana Saleem, "Transparency International Pakistan-Highlights," Pro Pakistan, September 24, 2009 at: http://www.pro-pakistan.com/2009/09/24/transparency-international-pakistan-highlights/ (accessed June 16, 2010).

142. Transparency International, "Corruption Perception Index Report, 2010," at: http://www.transparency.org/policy_research/surveys_indices/cpi/2010/results (accessed October 27, 2010).

corrupt.[143]   Pakistan was also mentioned in a Harvard report as being under threat of losing nuclear material due to corruption. The report states:

> Insiders among the elite group guarding then-Pakistani President Pervez Musharraf cooperated with al Qaeda in two assassination attempts that came within a hair's breadth of succeeding. If the military personnel guarding the President cannot be trusted, how much confidence can the world have in the military personnel guarding the nuclear weapons?[144]

This should come as no surprise to anyone who has studied the history of Pakistan's nuclear program, for its relationship to corruption is incestuous, being born through what has been called "one of history's worst nuclear scandals" under the supervision of A.Q. Khan, the "father of Pakistan's nuclear program."[145, 146] There is enormous evidence to suggest Dr. Khan has been corrupt since the 1970s, by first stealing nuclear designs and information from the Netherlands, then transforming it into a deadly weapon, and finally selling it all to the highest bidder. He and his company, Khan Research Laboratories (KRL), became clandestine proliferators of nuclear technology and weapons-grade uranium for almost three decades.

Dr. Khan first began helping Pakistan build its nuclear weapons capability while employed in the Netherlands. When The Netherlands began to suspect him of stealing their information and technology, Dr. Khan fled back to Pakistan, bringing with him The Netherlands' centrifuge designs that could be used to make weapons-grade uranium.[147]

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143. Owais Ehsan, "Transparency International Corruption Report 2010- Highlights," Pro Pakistan, June 3, 2010 at: http://www.pro-pakistan.com/2010/06/03/transparency-international-corruption-2010-highlights/ (accessed June 16, 2010).

144. Matthew Bunn, *Securing the Bomb 2010,* (Washington, D.C.: Project on Managing the Atom, Belfer Center for Science and International Affairs, Harvard Kennedy School and Nuclear Threat Initiative, April 2010), 30.

145. John Warrick, "Nuclear Scientist A.Q. Khan Is Freed From House Arrest." *Washington Post*, February 7, 2009 at: http://www.washingtonpost.com/wp-dyn/content/article/2009/02/06/AR2009020603730.html (accessed October 2, 2010).

146. Global Security.org, "A.Q. Khan," at: http://www.globalsecurity.org/wmd/world/pakistan/khan.htm (accessed September 28, 2010).

147. Mark Fitzpatric, *Nuclear Black Markets: Pakistan, A.Q. Khan and the Rise of Proliferation*, (London: The International Institute for Strategic Studies, Arundel House, 2007), 1962.

The Netherlands discovered this and tried him in absentia, where he was convicted in 1983 of nuclear espionage and sentenced to four years in prison.[148]

Lest one confuse Dr. Khan's motivations with that of a patriot to his native Pakistan, Dr. Khan did not keep his secrets in his own country. Instead, he sold his nuclear knowledge and materials for his own financial gain, making many millions of dollars in transactions to rogue regimes and affiliates.[149] When Libya decided to terminate its nuclear weapons program and open itself up for inspection in 2003, it became evident that A.Q. Khan and KRL were behind much of Libya's technology.[150] Then, again in 2003, a team of international scientists discovered that HEU came from equipment Iran acquired from Pakistan.[151] It is reported that Khan also sold his technology to North Korea and possibly China, and even met with representatives of Iraq and al Qaida.[152] [153] [154] He supposedly did much of this without Pakistan's knowledge or consent, as he publicly confessed in 2004 and was placed under house arrest soon after.[155]

Pakistan's GDP per capita has grown modestly over the past decade, increasing from about $1,700 in 2000 to $2,550 in 2010.[156] Pakistan is still a relatively poor country, ranking 134th on poverty according to the CIA World Factbook—63 countries

148., "Chronology: A.Q. Khan," *The New York Times,* April 16, 2006, at: http://www.nytimes.com/2006/04/16/world/asia/16chron-khan.html (accessed October 4, 2010).

149. Chris Gourlay, Jonathan Calvert, and Joe Lauria, "For Sale: West's Deadly Nuclear Secrets." *The Sunday Times*, January 6, 2008, at: http://www.timesonline.co.uk/tol/news/world/middle_east/article3137695.ece (accessed October 2, 2010).

150. Gaurav Kampani, "Proliferation Unbound: Nuclear Tales from Pakistan", CNS Research Story, February 23, 2004, at: http://cns.miis.edu/stories/040223.htm (accessed Oct 2, 2010).

151. Anthony Cordesman and Khalid R. Al-Rodhan, *Iran's Weapons of Mass Destruction: The Real and Potential Threat*, (Washington DC: Center for Strategic and International Studies, 2006), 296.

152. Kampani.

153. New York Times, "Chronology: A.Q. Khan."

154. Robert Gibbs, "White House Press Briefing on Nuclear Security, Ukraine, Pakistan, Russia, Iran, China, North Korea." April 12, 2010, at: http://www.america.gov/st/texttrans-english/2010/April/20100413135342xjsnommis0.1356775.html (accessed October 2, 2010).

155. New York Times, "Chronology: A.Q. Khan."

156. Text from Trading Economics.com website "Pakistan GDP Per Capita (Purchasing Power Parity PPP)", at: http://www.tradingeconomics.com/Economics/GDP-Per-Capita-PPP.aspx?Symbol=PKR (accessed October 11, 2010).

lower than South Africa.[157]   Its HDI has improved steadily since 1980, but still ranks 141st out of 182 countries; in 1998, Pakistan ranked 135 out of 174 countries, while in 2005 it ranked 135 again out of 177.[158] [159] [160]   This trend seems to indicate that Pakistan has remained low in the HDI over the past decade when compared to other countries in the world, from the bottom 22.4 percent in 1998, to the bottom 23.7 percent in 2005, to the bottom 22.5 percent in 2009, painting a rather stagnant HDI picture.

Despite a modest increase in GDP per capita and stagnant HDI relative to other countries, Pakistan's CPI score has decreased over the past ten years. In 2000 it was 2.3, ranking it 79 out of 91 states.[161]   It decreased further by 2005 to a 2.1, ranking 144 out of 158.[162]   By 2009, it had gotten better, raising its rank to a 2.4, placing Pakistan at 139 of 180 countries.[163]   However, this is still far below the developed world and among the top 50 most corrupt countries on Earth. Given the above statistics, Pakistan appears rather stagnant, with only a minor increase in GDP per capita and HDI and a minor decrease in corruption. It still remains a desperately poor country, with a major corruption problem.

When examining Pakistan's Gini coefficient, it is very hard to get a consistent measurement. Some report as many as five different Gini coefficients depending on different gathering techniques.[164]   What may be seen, though, is that Pakistan's Gini coefficient seems to be steadily increasing since 2000, which could have a negative influence on its corruption. In 2000, one measurement of Pakistan's Gini coefficient was

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157. Text from World Lingo website, "List of Countries by GDP (PPP) per capita", at: http://www.worldlingo.com/ma/enwiki/en/List_of_countries_by_GDP_(PPP)_per_capita#cite_note-0 (accessed October 7, 2010).

158. Text from Human Development Report 2009 website, "The Human Development Index." Pakistan, 2009. at: http://hdrstats.undp.org/en/countries/country_fact_sheets/cty_fs_PAK.html (accessed October 18, 2010).

159. Human Development Report 2000, "The Human Development Index" Pakistan, 2000, at: http://hdr.undp.org/en/media/hdr_2000_back1.pdf, 149 (accessed October 18, 2010).

160. Human Development Report 2005, "The Human Development Index" Pakistan, 2005, at: http://hdr.undp.org/en/media/HDR05_HDI1.pdf, 221 (accessed October 18, 2010).

161. Transparency International, "Corruption Perception Index Report, 2000."

162. Transparency International, "Corruption Perception Index Report, 2005."

163. Transparency International, "Corruption Perception Index Report, 2010."

164. Huzaima Bukhari and Ikramul Haq, "Microfinance Empowers," *Economy of Pakistan*, May 2008, at: http://economyofpakistan.blogspot.com/2008/05/income-inequality.html (accessed October 18, 2010).

only about 0.265, but the same measurement showed the Gini coefficient rising every year thereafter to 2005, where it had nearly doubled to 0.40.[165] Unfortunately, there appears to have been little research on Pakistan's Gini coefficient since that time. This could be due to Pakistan's natural disasters, such as the massive 2005 earthquake and 2010 flooding, as well as government instability. However, Pakistan is also key in our study, due to the ongoing fight against al Qaeda along the western regions of Pakistan, as well as Pakistan's status as a nuclear power. Citizens may feel today that they have less economic opportunity in Pakistan due to the relatively high and rising Gini coefficient, which could fuel insurgency and transnational terrorism. If cyberspace governance can improve Pakistan's Gini coefficient, it may strengthen Pakistan as a state and reduce the risk of transnational terrorism.

C.   NIGERIA

To more adequately find the causal mechanisms of corruption, as well as its consequences, more data must be examined from other countries not limited to those with nuclear materials. Perhaps one of the most troubling case studies for corruption is the country of Nigeria. Between 1970 and 2000, the number of those in Nigeria who live on less than a dollar a month grew from 36 percent to 70 percent of the country's population.[166] With such a trend, most Nigerians have lost economically and many feel they will lose more in the future. Almost half of Nigeria's entire GDP is based on its oil industry, while 85 percent of this revenue goes to just one percent of the population.[167] The oil industry is centralized under the president, and local land titles and oil revenues flow from the central government, translating into the central government controlling 87 percent of the resources and local states controlling the other 13 percent.[168] This means the top one percent of the people control 42.5 percent of the GDP of the entire country,

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165. Shahzad Hussain, Imran Chaudhry, and Mahmood-ul-Hasan, "Globalization and Income Distribution: Evidence from Pakistan," *European Journal of Social Sciences*, 2009, 687.

166. Ed Kashi and Michael Watts, *Curse of the Black Gold: 50 Years of Oil in the Niger Delta*, (New York, NY: PowerHouse Books, 2008), 43.

167. Ibid.

168. Ibid., 219.

contributing to a Niger Delta Gini coefficient of 0.63.[169] For comparison, in the U.S. the top 20 percent control 49 percent of the nation's GDP, yielding a much more equitable Gini coefficient of .46.[170] [171] Given such a horrific disparity in Nigeria, it is not surprising that the number of those in poverty continues to grow and feelings of resentment, oppression and myopothy among those of the Niger Delta run high.

Local Niger Delta residents control virtually nothing as it relates to oil and energy, since they cannot prospect for themselves or invest in oil property. A centralization of money and power leads to, and indeed encourages, a Nigerian kleptocracy. Some experts have estimated roughly $130 billion has left the country between 1970 and 1996. A few years later in 2003, Nigerian anti-corruption official Ribadu estimated that 70 percent of Nigeria's oil wealth was stolen or wasted.[172] This flight of capital, and the effort to continue it through maintaining the flow of oil, has had the horrific double effect of preventing the government from having enough money to provide the positive rights of political goods and services while also facilitating the recession of negative rights through government coercion and neglect, thus preventing Nigeria from emerging as a liberal democracy.

To make matters worse, this deepening corruption combined with economic poverty diminishes the political legitimacy of the government and has fostered an insurgency. Ledum Mittee, the leader of the Movement for the Survival of the Ogoni People (MOSOP), aptly stated: "The challenge for this government is to say we want to now recover legitimacy."[173] Corruption and disparity are major grievances of the insurgents. This loss of government legitimacy may be reversed if corruption could be

169. Ukoha Ukiwo, "Causes and Cures of Oil-related Niger Delta Conflicts," Nordiska Afrikainstitutet, 2009, 2, at: http://www.nordiskaafrikainstitutet.com/policy_activities/ukiwo.pdf (accessed November 11, 2009); and Fred Weston, "The Abyss Facing Nigeria in the Face of the Growing World Crisis of Capitalism," In Defense of Marxism, 2008, 2, at: http://www.marxist.com/abyss-facing-nigeria-world-crisis-capitalism.htm (accessed November 11, 2009).

170. Robert Rector and Rea Hederman, "Two Americas," The Heritage Foundation, 2004, at: http://www.heritage.org/Research/Taxes/bg1791.cfm (accessed November 11, 2010).

171. Text from the United States Census Bureau website, "Gini Ratios by State," 1999, at: http://www.census.gov/hhes/www/income/histinc/state/state4.html (accessed November 11, 2009).

172 Ed Kashi and Michael Watts, *Curse of the Black Gold: 50 Years of Oil in the Niger Delta,* 43.

173. Ibid., 163.

reduced, thus improving citizens' perceptions of government. As citizens see more economic opportunity and prosperity, they will likely leave more risky options like crime and transnational terrorism. This could strengthen the state of Nigeria.

IV. CYBERSPACE AS SOFT POWER TOOL AGAINST CORRUPTION: MOBILE SURVEILLANCE

With the above examples, one may see that corruption has far more dire consequences than government inefficiency or stunted economic development. It can and has had a direct impact on U.S. national security, as corruption has led to the potential or actual spread of nuclear weapons technology to terrorist regimes and rogue states like Iraq, Iran, and North Korea. One must ask, then, if the U.S. should make its priority enemy states that pursue nuclear programs and nuclear weapons, like Iran or North Korea. Or, is one of the greatest threats to U.S. national security really with corrupt regimes and societies where nuclear materials exist?

To answer this question, it should be noted that South Africa and Pakistan are only two examples of a global phenomenon. The Nuclear Threat Initiative reports that, by 2003 there were at least 50 tons of HEU in civilian power and research facilities across over 50 countries, many of them among the lowest of CPI countries.[174] One such country, Kazakhstan, has a poor corruption index rating of 105th out of 178 nations in the CPI, and maintains thousands of kilograms in HEU across two reactors.[175] [176] Even if South Africa and Pakistan fix their problems, an intelligent adversary could simply go elsewhere, to Kazakhstan for instance, to find the least-secured HEU facility in the world.

What is the risk that this could happen? Risk is very subjective, since different people place different value on the same threats, vulnerabilities, and consequences. What can be safely said is that a terrorist does not use probability or random chance in deciding where and how to attack; in the face of an intelligent adversary, one cannot use probability. Instead, one must assume the adversary will attack where it would do the most harm and the window of opportunity presents itself. Using game theory, one can

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174. Text from the Nuclear Threat Initiative website, "Why Highly Enriched Uranium Is Such a Threat," September 2009 at: http://www.nti.org/db/heu/ (accessed September 12, 2010).

175. Transparency International "Corruption Perception Index Report, 2010."

176. Text from the Nuclear Threat Initiative website, "Civil HEU Stop Map," April 2010 at: http://www.nti.org/db/heu/map.html (accessed September 12, 2010).

assume any future terrorist attacks geared toward acquisition of HEU will occur at facilities like South Africa or Pakistan—places where weapons-grade uranium exists and, history has shown, guards and scientists can be bribed to look the other way or enticed to sell materials themselves.

The threat is also growing as South Africa and Pakistan are following a global trend. Currently, nuclear power produces 16 percent of the world's electricity. The International Atomic Energy Association (IAEA) predicts that this will grow 13 percent by 2020, mostly due to the environmental friendliness of nuclear power plants which do not produce as much greenhouse gas as the volatile fossil fuel market.[177] China and India also plan to pursue nuclear power, with plans to increase nuclear power up to six and ten times, respectively.[178] Furthermore, DHS Secretary Napolitano announced the U.S. would not be able to screen all cargo for WMD material by 2012.[179] If terrorists or dissidents were able to obtain HEU, they could transport it into the U.S. through legitimate ports of entry. Also, considering it only takes 25 kg of HEU to produce a nuclear bomb, it would be relatively easy to smuggle this across our vast borders undetected. Terrorists could fit this amount inside just six empty milk containers.[180] Even worse, HEU is surprisingly only slightly radioactive and can be handled by hand, making it extremely easy to transport.[181]

Fortunately, the world is at least addressing this concern at the highest levels. In 2009 the U.N. passed Security Resolution 1887, which calls on all nations to reduce HEU as much as possible. President Obama held a Nuclear Summit in April 2010 to encourage nations to exert more control over their nuclear fuel and eliminate weapons-

177. Keith Campbell, "Science, Medicine, Technology and Energy- All Need Nuclear," Engineering *News*, August 7, 2006 at: http://www.engineeringnews.co.za/article/x2018science-medicine-technology-and-energy-x2013-all-need-nuclearx2019-2006-08-07 (accessed September 14, 2010).

178. Ibid.

179. Global Security Newswire, "Napolitano Says U.S. Cannot Meet Cargo Screening Goals," The Nuclear Threat Initiative, December 3, 2009 at: http://gsn.nti.org/gsn/nw_20091203_5175.php (accessed September 14, 2010).

180. Text from the John F. Kennedy School of Government, "Nuclear Terrorism: Threat Briefing," Harvard, April 2010 at: http://belfercenter.ksg.harvard.edu/files/threat-assessment.pdf (accessed September 14, 2010).

181. CBS News, "Nuke Facility Raid an Inside Job?"

grade fuel like HEU.[182]   Many countries, like Chile, Serbia, the Czech Republic, and Ukraine, are repatriating their HEU stockpiles to Russia and the U.S.[183] South Africa is also attempting to do better. It has contracted with Russia to supply it with 45 percent of its LEU needs, reducing its dependence on the Pelindaba facility.[184] It has also begun converting the Pelindaba facility to use only LEU, eliminating the stockpile of HEU completely.[185] So, even if the facility is compromised again, any stolen uranium should not be viable for a nuclear weapon. All of these endeavors are being tracked and monitored internationally by the IAEA as well as locally by the National Nuclear Energy Association (NNEA) in Washington, D.C.[186]

However, these mitigations only consolidate the threat to countries with HEU stockpiles; they do not address the threat of corruption. In fact, they may make things worse. First, there is a danger that U.S. efforts will continue to be focused on state-based actors, as with Iran and North Korea, which may be dissuaded with more traditional military diplomacy (massive nuclear retaliation). Instead, U.S. efforts may be better served focusing on fighting corruption within states that maintain stockpiles of nuclear material. While Iran has been mentioned almost daily in news outlets for its pursuit of nuclear power (which is operated by Russia and only uses LEU fuel provided by Russia), few are talking about risk-prone states like Kazakhstan, South Africa, and Russia itself.[187]

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182. Fissile Materials Working Group, "Reduce the Civilian Use of HEU Now," Bulletin of the Atomic Scientists, March 30, 2010 at: http://www.thebulletin.org/web-edition/columnists/fissile-materials-working-group/reduce-the-civilian-use-of-heu-now (accessed September 12, 2010).

183. Ibid.

184. Tom Lamar, "Russia Signs New Uranium Deal with South Africa," *Nuclear Power Industry News*, August 6, 2010 at:
http://nuclearstreet.com/nuclear_power_industry_news/b/nuclear_power_news/archive/2010/08/06/russia-signs-new-uranium-deal-with-south-africa.aspx (accessed September 12, 2010).

185. Piani CSB, "SAFARI-1: Adjusting Priorities During the LEU Conversion Program," South African Nuclear Energy Corporation, at: http://www.rertr.anl.gov/RERTR28/PDF/S2-2_Piani.pdf (accessed September 12, 2010).

186. Text from the National Nuclear Security Administration website, "NNSA Announces Elimination of More Than 400 Metric Tons of Russian HEU," September 9, 2010 at:
http://nnsa.energy.gov/mediaroom/pressreleases/heutransparency80090910 (accessed September 15, 2010).

187. Text from the BBC website, "Iran Begins Loading Bushehr Nuclear Reactor," August 21, 2010 at: http://www.bbc.co.uk/news/world-middle-east-11045537 (accessed September 15, 2010).

The second danger of not addressing the real threat of corruption is that the current strategy for mitigating risk involves, as stated previously, consolidating HEU into a few countries with large nuclear stockpiles, such as the U.S. and Russia. If one examines Russia under the lens of corruption, one will see a picture even worse than Pakistan. The same Harvard study which suggested an immense threat within Pakistan of nuclear theft due to corruption also named Russia. Russia ranks even lower than Pakistan among the bottom 50 most corrupt countries at 154 of 178, or the 24th most-corrupt nation on Earth.[188] [189] Moreover, Russia's nuclear guards are conscripts who are poorly paid and trained, and are therefore prime targets for bribery.[190] Is the world really safer by having Russia guard so much weapons-grade nuclear material?

Finally, there is a third danger in not addressing the problems of corruption, in that solutions can have a broader impact beyond WMD to foster COIN and nation-building. It is estimated that $1 billion in foreign aid to Afghanistan, meant for stability operations, actually goes to the Taliban.[191] As little as 10 percent actually goes to the citizens of Afghanistan who desperately need the money due to corrupt officials.[192] Therefore, corruption plays a role, both in fostering transnational terrorists, the proliferation of WMD, and the decrease of stability in strategic countries.

The current focus on state governments alone is reminiscent of the Cold War when the U.S. worried about what the U.S.S.R. would do with its nuclear weapons. However, this is no longer the world we live in. With the globalization revolution and the birth of the Internet, the major threat now lies with networked individuals across the global market of transnational terrorism. This is the face of the enemy who already struck New York and the Pentagon nine years ago, killing almost 3,000 people. If a similar enemy can succeed through a corrupt, failing state by stealing just a few dozen

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188. Transparency International, "Corruption Perceptions Index 2009."

189. Transparency International, "Corruption Perceptions Index Report, 2010."

190. Bunn, "Securing the Bomb 2010; Securing All Nuclear Material in Four Years," viii.

191. Ed Barnes, "Up to $1 Billion in U.S. Air Winds Up in Taliban Coffers," *Foxnews.com*, October 22, 2010, at: http://www.foxnews.com/politics/2010/10/27/aid-winds-taliban-coffers/ (accessed October 28, 2010).

192. Ibid.

kilograms of material, they would be incredibly close to executing a nuclear sequel to 9/11. Only with HEU, they could destroy all of New York City and kill millions, not just disintegrate a few blocks and murder and wound thousands.

Instead of focusing the vast majority of its efforts on states, which would likely not attack us for fear of nuclear retaliation, the U.S. should double its efforts toward fostering capacity against corruption in all nations that possess HEU stockpiles or are vulnerable to failure. To do this, we must first understand the theory behind corruption and how it may be combated in these states. From here, we can attack the problem within states who maintain WMD using the principles of the global information revolution to our advantage, especially in states with secure storage of nuclear knowledge and material.

A.   GLOBAL DATA

There exists a general consensus among scholars that corruption is strongly linked to the Gini coefficient. Li, Xu and Zou found that "corruption alone also explains a large proportion of the Gini differential across developing and industrial countries."[193] Dincer and Gunalp found a strong correlation to corruption whenever a high Gini coefficient was present.[194]   Khagram and You collected data which suggests a two-way causality between a country's Gini coefficient and corruption.[195]   This increases the risk of transnational terrorism.

Although there is no universal agreed-upon law or equation which completely defines all the causes of corruption, it does seem that poverty and a lack of economic opportunity, as seen by a high Gini coefficient, have a compounding impact on corruption. Therefore, if there were a way to increase the GDP per capita for lower and

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193. Hongyi Li, Lixin Colin Xu, and Heng-fu Zou, "Corruption, Income Distribution, and Growth," *Economics and Politics*, vol 12, July 2000, at: http://siteresources.worldbank.org/DEC/Resources/SSAJ151.pdf, 1 (accessed October 18, 2010).

194. Oguzhan C. Dincer and Burak Gunalp, "Corruption, Income Inequality, and Poverty in the United States," Working Papers 2008 at: http://www.people.fas.harvard.edu/~iversen/PDFfiles/corruptinequality.pdf), 1(accessed October 18, 2010).

195. Sanjeev Khagram and Jong-Song You, "Inequality and Corruption," *American Sociological Review,* December 9, 2003, 15.

middle-income citizens directly, this should have a positive impact on the nation's Gini coefficient, and therefore also yield a positive impact on corruption based on Khagram and You's two-way causality.

Here, it should be noted that this is usually the exact opposite of traditional strategy, where wealthy nations pour in large amounts of foreign aid to developing countries through a "top-down" bureaucratic approach. Foreign aid, as it flows through the developing nation's government often does not improve the Gini coefficient. Instead, funds are usually siphoned off by corrupt officials in power, leading to further disruptions in the Gini coefficient with less opportunity for those whom the aid was intended and continuing instability. In 2002, the African Union stated that corruption was costing Africa $150 billion in development and aid.[196] A scathing 2009 report by Dambisa Moyo, a former economist at Goldman Sachs, stated "money from rich countries has trapped many African nations in a cycle of corruption, slower economic growth and poverty. Cutting off the flow would be far more beneficial."[197]

This is often true because the general population does not have access to these funds as they are absorbed and transferred through murky government processes and officials. There is very little transparency, which is defined by TI as "a principle that allows those affected by administrative decisions, business transactions or charitable work to know not only the basic facts and figures but also the mechanisms and processes. It is the duty of civil servants, managers and trustees to act visibly, predictably and understandably."[198] However, transparency is not the only issue discussed when fighting corruption. Consider that USAID titled its landmark journal on the subject of anti-corruption "Transparency and Accountability," stating ten years ago that "interlaced with

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196. Dambisa Moyo, "Why Foreign Aid Is Hurting Africa," *The Wall Street Journal*, March 21, 2009, at: http://online.wsj.com/article/SB123758895999200083.html (accessed October 18, 2010).

197. Ibid.

198. Text from Transparency International website, "Frequently Asked Questions," at: http://www.transparency.org/news_room/faq/corruption_faq#faqcorr2 (accessed October 28, 2010).

these objectives are the principles of increasing transparency and accountability."[199] The United Nations Educational, Scientific and Cultural Organization (UNESCO) as well as the World Bank also link transparency and accountability as the primary means to combat corruption.[200, 201] Accountability is generally defined as an obligation to accept or be held responsible for one's actions. Transparency and accountability are both necessary in combating corruption. If transactions aren't transparent, citizens will not have concrete evidence of wrongdoing by their officials. Consequently, if they know of this wrongdoing but no retributive action accompanies this knowledge, there is no accountability, and corruption still flourishes.

Transparency and accountability may counter corruption through a bottom-up approach, which circumvents government bureaucracy, since one may generate counter-corruption strategies which leverage these concepts to strategically attack the unequal economic opportunity that fosters a high Gini coefficient by directly supporting lower and middle class incomes. This would theoretically undermine corruption, since far fewer middle-men would be involved in transactions and government bureaucracy would be greatly reduced. Accountability can and should be fostered at the lowest and highest levels to reduce corruption as well as the development of terrorist havens and WMD smuggling.

There exists further literature and debate regarding corruption theory and the origins of corruption, to include cultural, structural, and rational-choice explanations. For instance, cultural frames explain corruption based on religious beliefs, such as Protestantism being tied to lower corruption rates, or based on familial ties, such as

199. Center for Democracy and Governance, "Promoting Transparency and Accountability: USAID's Anti-corruption Experience," USAID, January 2000, at: http://www.usaid.gov/our_work/democracy_and_governance/publications/pdfs/pnacf740.pdf, 7 (accessed October 12, 2010).

200. UNESCO, "Transparency, Accountability, and the Fight Against Corruption: FOI Laws and Beyond," World Press Freedom Day 2010, at: http://portal.unesco.org/ci/en/ev.php-URL_ID=29476&URL_DO=DO_TOPIC&URL_SECTION=201.html (accessed October 18, 2010).

201. Text from the World Bank website, "Governance, Transparency, Accountability and Anti-corruption Measures in Education," April 30, 2009, at: http://web.worldbank.org/WBSITE/EXTERNAL/WBI/WBIPROGRAMS/EDUCATIONLP/0,,contentMDK:22163036~menuPK:460926~pagePK:64156158~piPK:64152884~theSitePK:460909,00.html (accessed October 18, 2010).

Chinese and Italian extended families and organized crime networks, which traditionally sport higher levels of corruption and which e-governance is unlikely to influence. The remaining structural and rational choice factors may be different. One well-documented link in the cause of corruption is political, in that a strong correlation has been found between liberal democracies and low corruption.[202] This is linked primarily to increased levels of transparency found in liberal democracies that encourage public participation and protect freedom of the press, as well as in increased accountability, where those who are found to be corrupt are usually thrown out of office or prosecuted.[203] It is therefore likely that those who live in non-democratic countries experience much more limited transparency and accountability in governance, giving rise to more bribery and other manifestations of corruption such as embezzlement, blackmail, and intimidation. E-governance could help counter this by increasing transparency and accountability in government operations through e-money and surveillance. Both of these are expected to reduce corruption, which could, in turn, reduce the threat of terrorists acquiring WMD.

Fortunately, there are a growing number of technologies that can do this in today's twenty-first century Information Age, technologies that did not exist only a decade ago. These technologies no longer require the cumbersome and expensive infrastructure of servers, personal computers, and ground cables laid in industrialized nations. Today, they are already spread throughout the developing world, just waiting to be used in small, portable devices like the mobile money of Kenya. As discussed, mobile money already shows promise in combating corruption, crime, and quite possibly reversing a negative Gini coefficient trend. Mobile devices are becoming even more powerful as we approach the second decade of the twenty-first century.

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202. Lawrence Harrison and Samuel Huntington, *Culture Matters, How Values Shape Human Progress* (New York: Basic Books, 2001), 123.

203. Harrison and Samuel Huntington, *Culture Matters, How Values Shape Human Progress* , 123.

B.   CYBERSPACE SURVEILLANCE

Money, by itself, does not thwart crime. Only in money's strategic employment, by offering a means of banking to the poor and an exit from physical currency, with effective digital security and auditing, may it become a tool to combat crime. Cyberspace can help with this, as seen with mobile money. Similarly, surveillance alone does not combat corruption.   Who is monitoring the information, and what is done if the surveillance captures corruption?   Again, the strategic employment of mechanisms for transparency and accountability embedded in surveillance are necessary for surveillance to prevail in fighting corruption.

Army FM 3-0 defines surveillance as "the systematic observation of aerospace, surface or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic or other means."[204] The DoD usually groups surveillance under the greater umbrella of ISR, where intelligence is defined as "(1) the product resulting from the collection, processing, integration, analysis, evaluation, and interpretation of available information concerning foreign countries or areas; (2) information and knowledge about an adversary obtained through observation, investigation, analysis, or understanding."[205] Reconnaissance is defined as "a mission undertaken to obtain by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area."[206]

The DoD already possesses quality resources in surveillance under the umbrella of ISR, supported by various technologies like UAVs, satellites, and electronic eavesdropping. Secretary Gates has called for more ISR specifically, linked mostly to UAVs.[207]   However, since surveillance is usually grouped with intelligence and

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204. Army FM 3-0 at http://www.globalsecurity.org/military/library/policy/army/fm/3-21-21/chap3.htm (accessed October 30, 2010).

205. Ibid.

206. Ibid.

207. Amy Butler, "Gates Plans ISR Boost for Fiscal 2010," Maxwell AFB, AL, April 21, 2009, at: http://www.aviationweek.com/aw/generic/story_generic.jsp?channel=defense&id=news/ISR042109.xml&headline=Gates%20Plans%20ISR%20Boost%20for%20Fiscal%202010 (accessed November 7, 2010).

reconnaissance within ISR, which seems increasingly linked to UAVs, it is interesting to note what differentiates surveillance from intelligence and reconnaissance. For intelligence, FM 3-0 specifies "foreign" or "adversary." Reconnaissance specifies "enemy" or physical characteristics of an area. ISR technologies are often therefore designed or used to fight the strategic, traditional wars that Secretary Gates discusses, against physical enemies or targets of interest. UAVs and Special Forces may use ISR effectively against transnational terrorists, but what about the corrupt enablers of those terrorists?

Only surveillance, which has a broad definition of simple observation of people or places, is adaptable outside the framework of the traditional, adversary-centric role of military ISR. Surveillance may therefore prove useful in operations specific to nation-building, where specific military "hard power" targets cannot be identified. Furthermore, surveillance can be magnified through cyberspace to foster transparency and accountability, and therefore be an effective tool in fighting corruption.

1. Mobile Surveillance

Returning to the breached South African Pelindaba nuclear facility of 2007, surveillance was used for the facility's security. As mentioned earlier, Pelindaba was protected by closed-circuit television cameras inside a secure control room.[208] However, this surveillance was very traditional in its approach, in that it was apparently not connected to any other systems and was only monitored by human guards. Corruption for these guards is suspect, since the one guard who did call police stated "a camera at the fence taped the intruders, but guards who were supposed to be watching the monitors didn't report the men."[209] This is why the guard, Mr. Gruber, thought that bribed guards, who were supposed to be monitoring surveillance, were responsible for allowing an attempt to steal enough HEU to build a dozen nuclear bombs. Despite being on site, the guards did not respond for 45 minutes.

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208. Stujit, "South Africa Cannot Protect Its Nuclear Stockpile."

209. CBS News, "Nuke Facility Raid an Inside Job?" 3.

Traditional, physical surveillance is co-located with the location that is being surveyed, either with real-time guards or tape that may be accessed off-site but is still located and collected at the location. This pairing of observation and accountability can be exploited, as may be the case at Pelindaba. Once the target was set, the criminals only needed to find the local guards and offer them substantial money to look the other way.

With modern cyberspace technologies, however, physical surveillance need not be at the same facility, or even the same government entity, as that which holds the nuclear material. This makes it much more difficult for the criminals or terrorists, since they must first figure out who is watching the cameras. If those individuals are in another location, perhaps even across the country, they must locate and bribe them as well. However, unlike closed caption television, video through the Internet can be replicated repeatedly and streamed to multiple locations with great resiliency. Even if terrorists could find the location off-site where surveillance was being monitored, they are unlikely to find multiple sites, thus improving transparency and accountability.

These types of cameras are already in use, though not for nation-building or fighting corruption. An interesting application is a site called Africam, which sets up several cameras on wildlife preserves. Anyone with an Internet connection can simply pick the site he or she wants to watch, and after a brief advertisement from the sponsor, can watch the spot they selected in real time.[210] These cameras may be monitored by thousands of individuals, real time. Such technology may be effective in guarding sensitive targets like WMD facilities, since they lend themselves to robust transparency and accountability. No single site or guard could be targeted for bribery.

These technologies also differ vastly from traditional physical surveillance in that they are extremely cheap and can be wirelessly transmitted anywhere in the world. One example is an Internet camera made by Linksys, which can detect motion, send live video

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210. Text from Africam.com's website, "Cam Info" at: http://www.africam.com/wildlife/cam_info (accessed June 8, 2010).

wirelessly to a smart phone anywhere in the world, but only costs $85.[211, 212] Such high capability, combined with low cost and little infrastructure requirements, would be ideal for developing nations, allowing multiple cameras to "guard" a site and paths to that site. These solutions could also be used in a plethora of circumstances beyond sensitive areas, to include police checkpoints that are known to fail due to corrupt police.

The BBC reports from Iraq that trucks, which are required to receive special inspections due to their use as car bombs, often go unchecked due to bribed guards. In discussing a truck bomb which killed over 100 people in Bagdad, BBC reported:

> Iraq's state television channel has broadcast what it said was a confession by one of the organizers of the 19 August bombings, who spoke of paying $10,000 to get a truck laden with explosives into the centre of the capital. Some doubt this confession. Investigations continue. But insurgents are known to have used this tactic many times before to bypass security checks. And 11 security personnel have so far been arrested in connection with last week's attacks.[213]

One way this may be combated is through cheap, mobile security cameras placed inside security checkpoints. Guards would be less likely to take bribes and not inspect vehicles if they knew they might be monitored by other personnel at an undisclosed location.

This may seem unrealistic, but this is already bearing fruit in Afghanistan. While the United States has focused its counter-corruption efforts toward prime targets of Afghan leaders and foreign contractors, a non-profit NGO named Integrity Watch Afghanistan (IWA) has been working in 105 communities to monitor local corruption:[214]

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211. Text from Linksys By Cisco website, "See It, Live," at:
http://www.linksysbycisco.com/LATAM/en/products/WVC80N (accessed October 30, 2010).

212. Text from Google Products website, "Linksys Wireless-N Internet Home Monitoring Camera WVC80N Network camera - fixed," at:
http://www.google.com/products/catalog?q=Internet+camera+wireless+n&um=1&ie=UTF-8&cid=17118669370997604980&ei=eKTRTPK_IIfCsAP_lPXMCw&sa=X&oi=product_catalog_result&ct=result&resnum=3&ved=0CCsQ8wIwAg# (accessed October 30, 2010).

213. Andrew North, "Corruption Undermines Iraqi Security," *BBC News*, August 28, 2009, at:
http://news.bbc.co.uk/2/hi/8226076.stm (accessed October 30, 2010).

214. Ben Arnoldy, "Afghanistan Corruption: How One Town Battled a Shoddy School and Won," *The Christian Science Monitor*, August 20, 2010 at: http://www.csmonitor.com/World/Asia-South-Central/2010/0820/Afghanistan-corruption-How-one-town-battled-a-shoddy-school-and-won, 1 (accessed November 3, 2010).

Staff identify one reconstruction project to monitor in each community. Residents then choose two volunteers to visit the construction site at least twice a week. They are armed with cameras to take pictures and video interviews with foremen. In best case scenarios, they get their hands on copies of the contract.[215]

IWA has had numerous success stories using this technique, forcing several reconstruction projects to alter course.[216] They now have plans to expand their operations to government officials with reports directly to the heads of each Ministry in the Afghanistan government.[217] This program could be greatly expanded and automated throughout the country for very little capital outlay or maintenance.

2.   Transformation from Physical to Cyber

The advancements of this technology go beyond physical surveillance as discussed above. These cameras could also be used for more complex, informational computing, such as face recognition technology or audio eavesdropping, to find suspected terrorists and trace their movements. Again, this may seem like a daunting task for small cameras in a developing nation with little infrastructure. However, this technology may prove more achievable than many think.

The Search for Extraterrestrial Intelligence (SETI) supercomputer was born in 1999.[218] Using open-source software called BOINC, it was called the fastest supercomputer in the world.[219] It still holds this title. For comparison, BOINC software processed 3.4 quadrillion calculations per second on November 1, 2010.[220] This was

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215. Arnoldy, "Afghanistan Corruption."

216. Ibid.

217. Ibid., 2.

218. Text from the The Search for Extra Terrestrial Intelligence at UC Berkeley website, "SETI at Berkeley," at: http://seti.berkeley.edu/ (accessed October 29, 2010).

219. Ibid.

220. Text from BOINC website, "BOINC Stats", November 1, 2010 at: http://boincstats.com/stats/project_graph.php?pr=bo (accessed November 1, 2010).

almost a quadrillion calculations per second faster than the "fastest supercomputer in the world," the Chinese supercomputer Tianhe-1A, which only processes 2.5 quadrillion calculations per second.[221]

BOINC achieved this fast calculation rate because it works differently than the traditional computer. It does not have a large, physical body as does the traditional supercomputer. Instead, BOINC uses volunteers with regular PCs, then outsources data to those computers for processing during idle time. These PCs are then networked through BOINC to a central server which downloads data after it has been processed at each PC. The users experience no inconvenience, while the central server gets tens of thousands of volunteer processors it never had before.[222] Using this distributed computing model, sometimes also called grid computing, one can achieve even better results than a physical supercomputer. Furthermore, this technology can be leveraged with minimal additional cost. BOINC is free for use and can run on very simple, cheap computers like smart phones and gaming consoles.[223] Therefore, even the smallest and most mobile of computers could be turned into seeing and listening devices with a central "brain" supercomputer analyzing the data, without the need for a large architecture or a physical supercomputer.

The cyberspace application of surveillance suggests that countries guarding WMD or fissile materials could benefit from these or similar e-governance solutions, as well as countries with poor physical infrastructures where the U.S. is involved in nation-building. For instance, instead of a central command and control structure that is manned by human beings on location, a country could use a distributed data repository that is backed up and monitored by electronic sensors controlled remotely. Vast arrays of monitors could be connected and configured to stream live data to any government official, to include not just security personnel, but their supervisors as well. It could even

221. Vik Bhardwaj, "Chinese Supercomputer Ranked Top Supercomputer," *The Daily Illini*, November 1, 2010 at: http://www.dailyillini.com/node/45038 (accessed November 1, 2010).

222. Text from The Planetary Society Website, "SETI@Home, What We Do," at: http://www.planetary.org/programs/projects/setiathome/ (accessed June 9, 2010).

223. Text from BOINC website, "Boinc," November 3, 2010, at: http://boinc.berkeley.edu/ (accessed November 3, 2010).

be configured to sound an alarm automatically with no human intervention required. Such a solution would provide redundant transparency, since streaming video could be replicated and accessed by many government officials and agencies, as well as citizen watch groups. It would also provide greater accountability, since supervisors and citizens could have access to the same information as the guards they employ. It would only be limited by the depth of strategic vision and the resources dedicated to integrate it into the host country.

It is possible that sophisticated terrorists could attempt to circumvent these measures. Terrorists may attempt to disrupt, block, or attack physical surveillance or distributed computing. This risk could be mitigated somewhat with robust connections, automatic responses and security measures. However, this goes beyond the scope of this thesis, in that this risk is more technical in nature and not specific to surveillance as applied against corruption.

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V.   CONCLUSION

Mobile money and mobile surveillance are only two technologies examined in this thesis. The scope of all technologies that may be utilized through cyberspace to project soft power within the context of DoD operations, or especially within the context of the entire federal government, goes far beyond this work. However, by focusing on just these two technologies, it has been shown that effective use of mobile money through cyberspace, as sponsored by either the DoD, other aspects of USG, or host nations, may prove effective in nation-building missions by providing greater security against robbery specifically and crime in general. Furthermore, mobile money and mobile surveillance may also have a positive impact against corruption, which would bring greater security in the context of transnational terrorists and their efforts to acquire WMD. These technologies, as well as many other capabilities in cyberspace, may be very effective toward building the hybrid capability that is so useful in soft power, and for which the DoD is now pursuing toward nation-building missions as well as counterterrorism.

The United States can use these e-governance practices through cyberspace not only within nations where stability operations and nation-building operations exist, but also in weak and failing states where the United States may become embroiled in the future. As mentioned earlier in this thesis, Kenya is ranked just above Sudan in the HDI. Southern Sudan is rich in oil resources, yet is voting for their independence from Sudan in January.[224] This poses a large risk in violence. Already over $60 million has been pledged by international donors for contingency planning.[225] What will happen if there is a disaster, with wide-scale violence, and AFRICOM is tasked to intervene? Perhaps these lessons will be valuable to Sudan, or any other future mission, where the United States finds itself building nations while also combating transnational terrorists. They are already bearing some fruit in Afghanistan.

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224. Associated Press, "UN Official Says Southern Sudan's January Independence Vote Holds Unprecedented Risks," *The Star Tribune*, November 5, 2010, at: http://www.startribune.com/world/106759043.html (accessed November 5, 2010).

225. Ibid.

It is useful to consider how much cyberspace has evolved as we enter into the second decade of the twenty-first century. However, we must also consider that cyberspace will continue to evolve, as will the people who use it. As devices continue to become more portable and accessible to the developed world, how many Internet users in the developed world will the ITU report in 2015, or 2020? Due to the low literacy rate in Afghanistan, Afghan mobile users of M-Paisa are already getting Dari and Pashtu voice recognition capability.[226] Afghans no longer need to read menus or navigate with numbers. Cyberspace is opening to them, just as it is opening to anyone and everyone, even those in the most rural of areas and without any formal education.

There will likely come a day in the not so distant future when the developing world catches up to the developed world in sheer Internet connectivity. By the third or fourth decade of the twenty-first century, people in the developing world will still likely lack the resources and advanced applications of the developed world. However, by that time they will at least have access to many of the cyber resources and capabilities the developed world enjoys today. Their mobile phones may be capable of connecting to Internet services the way our smart phones do today, perhaps even more so. This connectivity will lend itself even further to cyberspace soft power.

Given the U.S. military's new focus on cyberspace and soft power, and the hybrid types of conflicts that come with nation-building and counterterrorism, the DoD and USG should consider leveraging these goals together. Cyberspace power is unique and lends itself very effectively to soft power, perhaps even more so than the other domains of air, land, sea and space. This thesis has attempted to demonstrate this is possible, in that cyberspace is no longer an exclusive technology to be leveraged only in strong nations with robust infrastructures. Nations can be built through cyberspace, even in weak states or post-conflict scenarios where computers and electricity are problematic.

Furthermore, pursuing this soft power through cyberspace will become more critical as more nations enter the world as nuclear powers and even more build nuclear power facilities. With the threat of WMD growing, the United States and its allies should

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226. Text from Roshan website, "About M-Paisa," at: http://www.roshan.af/Roshan/M-Paisa.aspx (accessed November 2, 2010).

attempt to export this cyberspace soft power to help these nations ensure terrorists do not obtain nuclear grade fuel. What if Iran, which has a uranium fuel agreement with Russia, also agreed to stream their surveillance and security feeds into a Russian security agency? Although the United States may not trust Russia as much as other allies, it would provide some modicum of better security than trusting Iran by itself. Other moderating nations, like Brazil, could also be of use in bridging the surveillance gap with Iran. Such technology, implemented correctly, would be a welcome complement to the current singular solution of sporadic UN inspections. Iran would no doubt be problematic and difficult to pursue, but it is still worthy of consideration for other nations as well.

There exists a darker side to this technology as well. There is a risk that terrorists or criminals could hack into these technologies and turn them against us by stealing money virtually or gaining access to sensitive surveillance images. This risk could be mitigated by good information system security practices. Regardless, the benefits are worthy of consideration, especially given the fact that there is already a security risk within weak states that are not yet using this technology.

Regardless, more research is needed in the future, especially as mobile money and mobile surveillance become more prominent in the developing world. Various indices, like the HDI, CPI, Gini coefficients, and crime rates, should be closely monitored in countries like Kenya, South Africa and Afghanistan which aggressively pursue this technology. Also, institutions from the DoD, DoS, NGOs and private companies should be encouraged to invest in these efforts to help states at most risk of failure.

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